Chemical Week

A McGRAW-HILL PUBLICATION PRICE FIFTY CENTS



Brush Beryllium reorganizes, readies for market-building push p. 27

New glass-ceramic: eager prospect for high-temperature processing jobs p. 47

Buoying phosphate fortunes: cost-cutting new flotation cell ...p. 75

Acetone surprise— Enjay, Allied boost capacity; and more coming p. 87



All Detroit agrees

Automotive designers have the impossible job of trying to please every new car purchaser. But American car makers agree on one point: The first coat of paint that goes next to the metal should be based on epoxy resin.

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IRON—tableted iron oxide.

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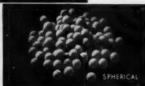
NICKEL-ALUMINA - a spherical catalyst available as hard spheres measuring 1/4" to 1" diameter—used for some types of gas reforming.

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DESULFURIZATION CATALYSTS

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ZINC OXIDE — a pelleted zinc catalyst used in the desulfurization of

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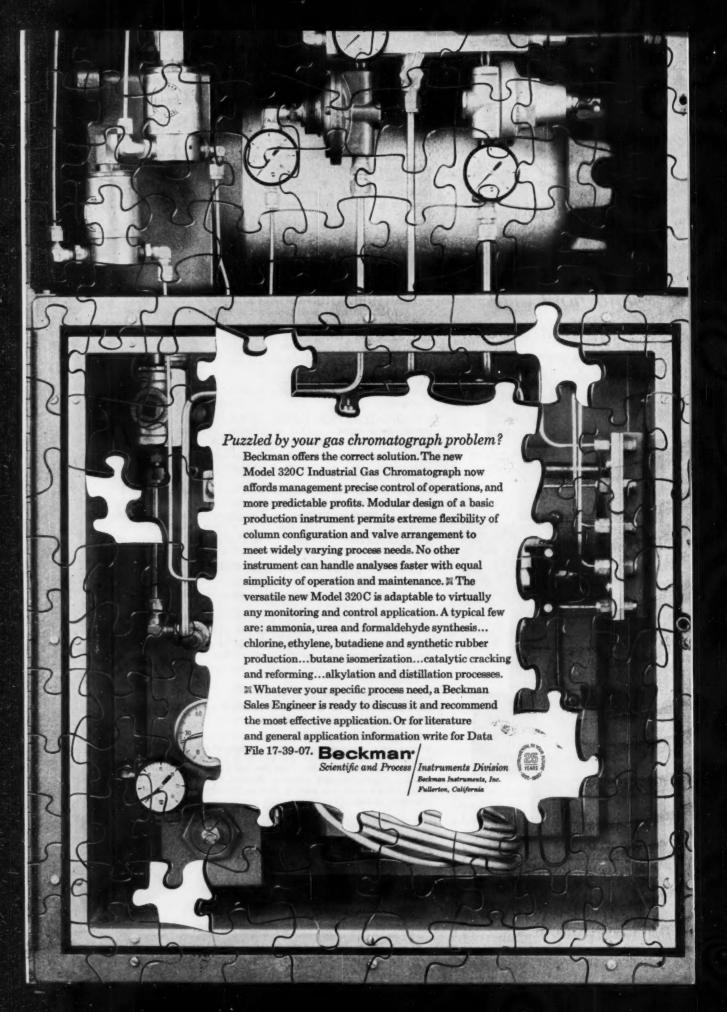
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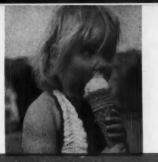
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ON THE COVER: Ice cream cone held by typical consumer owes absence of drip and improved texture to new emulsifiers -goal of strong research programs by a number of chemical firms.



Chemical Week

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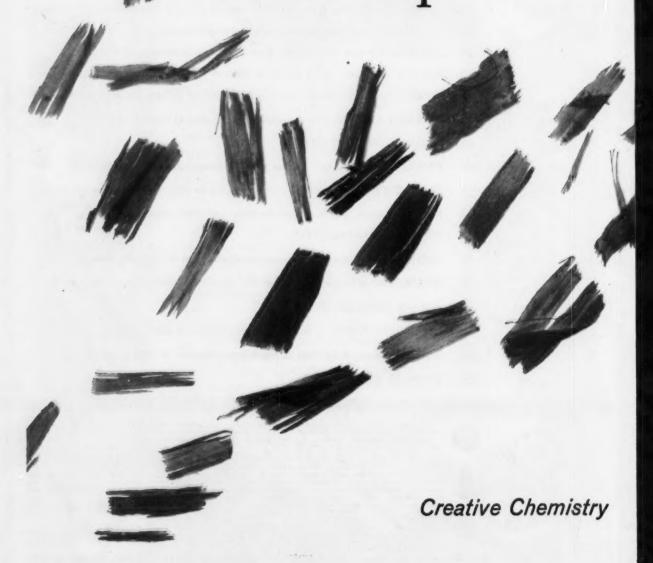
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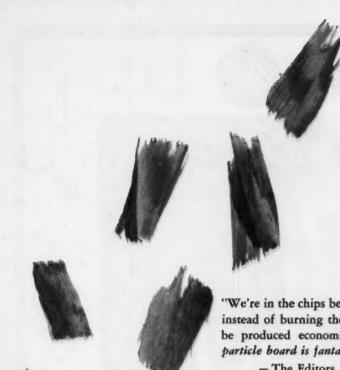


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Why the forest industries are really "in the chips"





"We're in the chips because, for one thing, we've learned to use chips instead of burning them! We've discovered a new product that can be produced economically and in great quantity. The future of particle board is fantastic!"

- The Editors, Hitchcock's WOOD WORKING (italics ours)

This statement is typical of the observations made by editors and writers who have analyzed the booming particle board industry. And as a principal supplier of the high quality bonding agents so vital in particle board production, Reichhold has been closely involved in this success story. In fact, RCI adhesives specialists actually studied requirements and came up with authoritative recommendations for a number of manufacturers before their plants were in operation!

Nor is this "from-the-ground-up" participation by RCI restricted to the particle board industry. Plywood production and furniture-making are two more areas in which Reichhold's broad experience and full line of adhesives have been put to good use by manufacturers—time and again, to help solve a wide variety of problems.

This concept of total service on the part of the forest industries' suppliers is a vital ingredient in maintaining dynamic growth. It helps explain, too, how Reichhold's "creative chemistry" has indeed been a "partner in progress". Many times over! And RCI will continue to be a partner — your partner, possibly — in the success stories that are waiting to be written in the "skyrocketing" sixties!

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Cutter Decision vs. Justice

THE LAW SHOULD MAKE SENSE and the courts' interpretations should be acceptable to reasonable men. It seems to us that these obvious tenets have been violated by the California district court of appeals in its recent affirmation of a verdict holding Cutter Laboratories liable for damages arising from the contraction of polio by two children inoculated with Cutter-made Salk vaccine.

Liability implies fault, but whose fault was it that these children contracted polio? The doctor's, because he prescribed the vaccine? The pharmacist's, because he dispensed it? Cutter's, because it made it? Or the federal government's because it encouraged its use and laid down the specifications under which it was manufactured and tested?

It seems to us—untrained in the tortuous intricacies of the law—that it was nobody's fault, since all of these parties were acting in good faith. Far from being negligent, they were specifying, manufacturing, prescribing and dispensing to the best of their abilities. The trial jury held, indeed, that Cutter was not negligent but was liable for breach of implied warranty. But by whom was the warranty implied? By the government, it seems to us, in that it assumed the authority to determine the manufacturing and testing procedures.

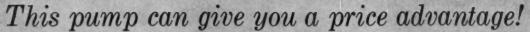
But is it reasonable to hold the government responsible when it did its best, with the scientific knowledge available at the time, to assure purity and safety?

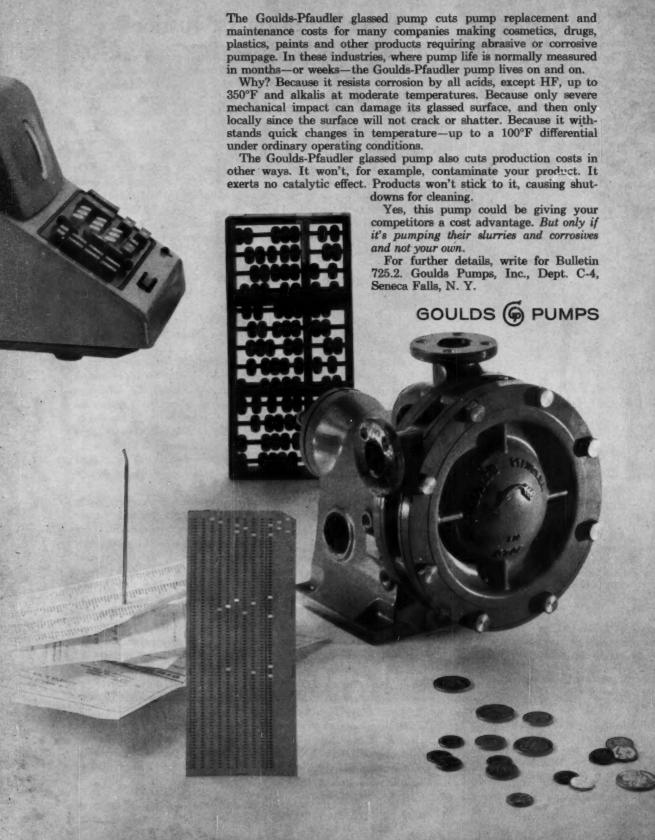
One obviously can't blame the children, but what about their parents? Almost every action in life is a calculated risk, whether it's crossing a street or eating in a strange restaurant. We weigh the advantages against the risks—in this case the advantages of inoculation against the risk of contracting polio, and the further risk attending the inoculation itself. (If a vaccination is voluntary, justice untempered by mercy might say that, since no other party was negligent, the parent is liable for the effects of his decision. But if it is compulsory—required by a local school district, for example—then the government body might well be held liable.)

But it is unmerciful as well as unjust to dump the problem in the parents' laps. They were certainly acting in good faith, with the encouragement and implied warranty of their federal government. They should be compensated—not by Cutter, but by the federal government, which through its agencies encouraged vaccination and implied that the procedure was safe. Such compensation would imply no negligence on the government's part, but would simply recognize that its best safeguards weren't good enough. (This proposal, we recognize, opens a Pandora's box of problems. Would the government be liable, for example, in the crashes of the FAA-certified Electras?)

We suspect that many of these philosophical speculations were not pursued by the courts. The children contracted polio, money was needed, and Cutter was the easiest mark. Warren Friedman, counsel for Clairol, Inc., said last week, "Product liability should never become merely a risk-spreading socialistic mechanism whereunder the party best able to pay foots the bill."

In the absence of clear laws laid down by Congress and state legislatures, judges and juries may be tempted by sentimentality or expediency away from justice. Product liability is a complicated tangle, but decisions like the Cutter appeal make it abundantly clear that unsnarling is urgent.





Brazilian Imports

To THE EDITOR: I enjoyed reading your article on the chemical development in Brazil (Aug. 13, p. 28). It is possible, however, that in statistics of chemical imports for '58 the figures for potash and phosphate under manufactured fertilizers are reversed. Exports of triple superphosphate from the U.S. alone were slightly in excess of 100,000 tons, besides importation of approximately 100,000 tons of phosphate rock from the U.S. and North Africa.

BRUCE C. MARSHALL Chemical Export Sales Manager International Minerals & Chemical Corp. Skokie, Ill.

The potash figure is correct, but by a slip in transcribing we copied the figures for urea instead of the correct phosphate figures.

The '59 figures are now available. They show imports of phosphate fertilizers at 67,031 metric tons, valued at \$4,128,776, and potassic fertilizers at 95,303 metric tons, valued at \$4,512,757.-ED.

Also in Danbury

TO THE EDITOR: Your "Stamford: Self-Styled Lab Haven" is an excellent account of how Fairfield County has geared itself to the new research era. You have, however, limited the report by omitting other sections of the country where important research activities are progressing, notably the Danbury area.

> ABNER W. SIBAL State Senator Norwalk, Conn.

Already Onstream

To THE EDITOR: I read with interest your article on Diamond Alkali Co.'s growing activity in agricultural chemicals in Mexico (Aug. 20).

I noticed in particular the summary of what other agricultural chemical producers were doing in Mexico (p. 76) and the statement that our Mexican affiliate, "Montrose Mexicana is bringing onstream a \$4.8million plant to produce DDT and other chemicals."

As a matter of fact, Montrose Mexicana's DDT plant went onstream in Dec. '58 (CW, Dec. 13, '58) and has been producing at its rated capacity of 1 million lbs./month. The chlorine-caustic soda plant built by Montrose Mexicana went onstream in Aug. '59; the chlorine is captive, used in production of our DDT; and the caustic soda is sold locally.

> SAMUEL ROTROSEN Montrose Chemical Co. Newark, N.J.

MEETINGS

American Institute of Chemical Engineers, national meeting, Mayo Hotel, Tulsa, Okla., Sept. 25-28.

Instrument Society of America, instrument-automation conference and exhibit, New York Coliseum, New York, Sept. 26-30.

Technical Assn. of the Pulp and Paper Industry, testing conference, Pantlind Hotel, Grand Rapids, Mich., Sept. 27-

American Ceramic Society, materials and equipment and white wares division, Bedford Springs Hotel, Bedford, Pa., Sept. 28-Oct. 1.

American Institute of Mining, Metallurgical and Petroleum Engineers, fall meeting, Denver, Colo., Oct. 2-5.

Society of Plastics Engineers; theme: "Plastics vs. Corrosion"; Mark Hopkins Hotel, San Francisco, Oct. 5.

Technical Assn. of the Pulp and Paper Industry, fifth de-inking conference, Conway Hotel, Appleton, Wis., Oct. 5-7.

American Institute of Mining, Metallurgical and Petroleum Engineers, Rocky Mountain Minerals Conference, Newhouse Hotel, Salt Lake City, Utah, Oct.

American Assn. of Textile Chemists & Colorists, 1960 national convention, Sheraton Hotel, Philadelphia, Pa., Oct.

International Plastics Congress, Amsterdam, Holland, Oct. 10-12.

Technical Assn. of the Pulp and Paper Industry, 10th corrugated containers conference, jointly sponsored with Technical Section, Canadian Pulp and Paper Assn., Royal York Hotel, Toronto, Can., Oct. 10-13.

Synthetic Organic Chemical Manufacturers Assn., meeting, Roosevelt Hotel, New York, Oct. 11.

The Magnesium Assn., 16th annual convention, Pick-Carter Hotel, Cleveland, Oct. 17-19.

Technical Assn. of the Pulp and Paper Industry, 15th plastics-paper conference, Hotel Syracuse, Syracuse, N. Y., Oct. 17-19.



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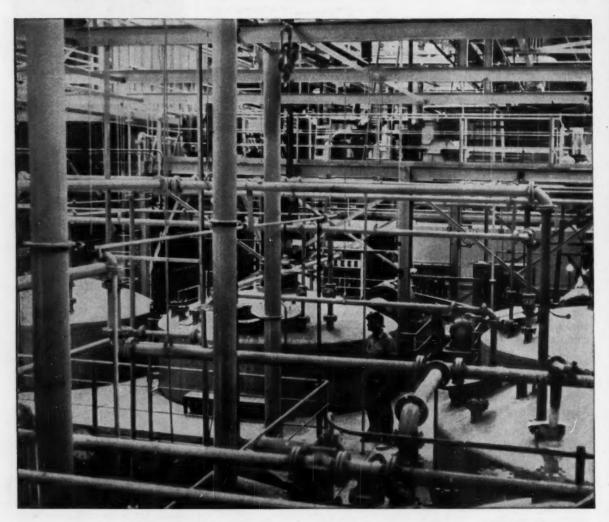
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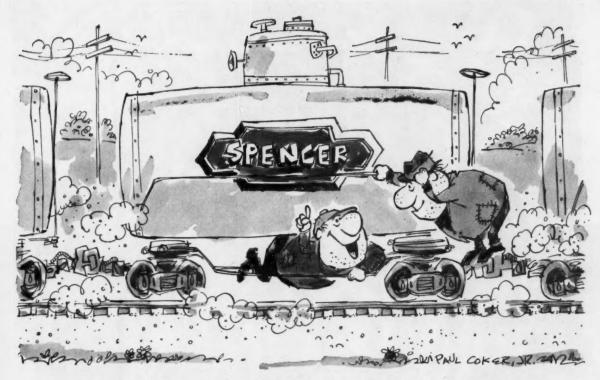
ican Cyanamid since installation four years ago.

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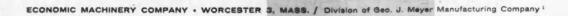


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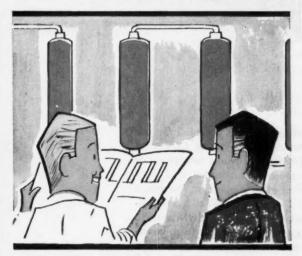


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Business Newsletter

CHEMICAL WEEK

September 24, 1960

In the face of generally declining capital expenditures throughout the economy, the CPI is continuing its upward trend (CW, Sept. 17, p. 40).

SunOlin Chemical—jointly owned by Olin Mathieson and Sun Oil—will build a \$20-million plant adjacent to Sun Oil's Marcus Hook, Pa., refinery. Plant capacity: 225 million lbs./year of ethylene, 55 million lbs. of ethylene oxide. Most production will be sold on the open market (largely through a pipeline system crossing the Delaware River to New Jersey); some will be used by the parent companies.

Naugatuck Chemical Division of U.S. Rubber will build a \$2-million plant for trial production of new stereoregular synthetic rubbers in Baton Rouge.

Shell Chemical is about ready to announce the details on its new isoprene plant (CW Business Newsletter, May 14). The integrated, 80-million-lbs./year monomer-polymer plant will probably be built on the Ohio River in southern Ohio. Hydrocarbon feedstocks will come from Shell's Wood River, Ill., refinery, 400-500 miles away.

American Cyanamid will begin next week construction of a "less-than-\$1-million" paper resins plant at Vancouver, Wash., scheduled for completion in early '61.

Longer-range expansion can also be seen:

Consumers Co-op (Kansas City, Mo.)—now expanding (for year-end completion) its Lawrence, Kan., fertilizer plant by 100 tons/day more ammonia, 40 tons/day more urea—is studying a move into petrochemicals. Co-op owns refineries, has access to natural gas, and could use some petrochemicals itself—in insecticides, antifreeze, paint.

Union Carbide has bought a 1,250-acre site at Taft, La., across the Mississippi from the Shell Oil and Shell Chemical complex at Norco, La., five miles upriver from Monsanto's Luling, La., plant. The land, Carbide's first in Louisiana, has not been earmarked for any products yet, not even assigned to a division.

But the industry's new technology, on which many new plant projects are based, is also leading to the closing of several old plants. Atlas Powder will close its Giant explosives plant near Richmond, Calif., my mid-October, largely because of the big swing from dynamite to ammonium nitrate in industrial explosives. Du Pont, over the next year, will gradually close its adiponitrile-from-furfural unit at Niagara Falls, N.Y., increase production of that nylon intermediate from butadiene at Victoria, Tex. Merck & Co. Ltd. is shutting its pharmaceutical chemicals plant at Valley-field, Que., and will consolidate manufacturing and marketing operations at its Montreal facilities. And Aluminum Co. of America will close its

Business

Newsletter

(Continued)

aluminum chemicals plant at East St. Louis, Ill., carry on with that product line at Bauxite, Ark., and Point Comfort, Tex.

Overseas biggest expansion news is in rubber and plastics:

- Goodyear is expanding its investments in Argentina. It will spend \$2.8 million to expand its Buenos Aires plant, including \$1.8 million from an Export-Import Bank loan. And in the Netherlands, near Tilburg, Goodyear has started up a tire remolding plant to serve Benelux nations.
- Another low-pressure polyethylene plant will go up in Europe. Staatsmijen (Dutch States Mines), whose high-pressure plant is slated to reach 25,000-tons/year capacity this year, will build a 10,000-tons/year low-pressure plant. To feed it, States Mines will expand its ethylene cracking unit from 15,000 to 23,000 tons/year.

U.S. relations with Cuba continue on the downslide. The latest slap at U.S. chemical interests is the seizure of the plant of Olin Mathieson's E. R. Squibb Division.

Puerto Rico will get its first caustic soda-chlorine plant. It will be a \$2-million joint venture of Wyandotte Chemicals and Peerless Oil & Chemical Corp., New York-based distributor that operates a liquid caustic importing and distributing business in Puerto Rico. The plant is expected to be in production by '62.

Florence, the season's sixth hurricane, will find the chemical process industries well prepared if it strikes. Although both Donna and Ethel hit hard at a number of important chemical-producing regions, plants were sufficiently battened down so that little damage or loss of production resulted. Harbison-Walker's Northwest Magnesite Co. says its plant near Cape May, N.J.—in the center of Donna's swath—was virtually undamaged. And Sun Oil's Marcus Hook, N. J., plant, also in Donna's path, was hit but escaped with barely a scratch. Says a Sun spokesman: "I guess you might say we're pretty well prepared for this kind of thing."

Power failures interrupted production in some areas. Thiokol's Trenton, N.J., plant was out eight hours and material in process had to be reworked. All phosphate mines and plants around Bartow, Fla., were knocked out for 24 to 48 hours. Other Florida CPI damage: a roof blown off at American Agricultural Chemical's warehouse at Pierce; extensive water damage in plant, offices and laboratory of the Noralyn mine of International Minerals & Chemical.

A power failure at Allied Chemical's chlorine-caustic plant at Brunswick, Ga., caused a buildup of gas pressure that ruptured piping. About one quarter of the plant is expected to be out for nearly two weeks.



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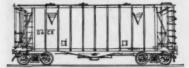
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COKE OVENS WANE -

Though steel companies are building new by-product ovens, they've become a dwindling source of chemicals.

REFINERIES GAIN -

Seeing bigger profit potentials in petrochemicals than in gasoline, oil companies are moving faster into aromatics.

Oil Taking Over Coal-Tar's Domain

The importance of petroleum as the basic source of benzene, naphthalene and other vital aromatics gained dramatic new affirmation this week. And petroleum companies now shape up larger than ever as producers of these commodities.

Affirmation comes from Socony Mobil Oil's Mobil Chemical Co. division, which is just launching a multimillion-dollar project to produce benzene and toluene at its petrochemical complex under construction near Socony's Magnolia Petroleum refinery at Beaumont, Tex. This unit—to be onstream in about 16 months—will initially have a benzene capacity of more than 30 million gal./year.

Socony's decision to go into petrobenzene comes just one week after four other companies unveiled new plant projects in this same field: Humble Oil & Refining at Baton Rouge, La.; Plymouth Oil at Texas City, Tex.,; Imperial Oil at Sarnia, Ont.; and British American Oil at Montreal East, Que. (CW Business Newsletter, Sept. 17).

Pacing the Parade: Farther along toward production of petrobenzene are South Hampton Co. at Silsbee, Tex., and Signal Oil at Houston. South Hampton has just put onstream the first Hydeal unit—a plant designed by Universal Oil Products (Des Plaines, Ill.) to convert a refiner's relatively plentiful toluene into the more valuable benzene by hydrodealkylation. And Signal appears to be the best bet for runner-up honors in the Hydeal race; its unit is expected to go onstream this year-end.

Earlier this month, Tidewater Oil and Union Oil's Collier Carbon and Chemical revealed plans for a joint venture to produce naphthalene from petroleum at Los Angeles (CW Business Newsletter, Sept. 10).

This is the country's fourth petronaphthalene project. Collier and Tidewater will build another such unit south of Wilmington, Del.; Sun Oil has one in the works for Toledo, O.; and Ashland Oil & Refining has started to build at Catlettsburg, Ky., a plant that will produce both naphthalene and benzene.

Various other oil companies—for example, Tennessee Oil Refining at Gretna, La.; Sunray Mid-Continent at Tulsa and Corpus Christi; Chemoil at New Orleans; Crown Central Petroleum, Houston—are building or

planning new units for producing benzene and/or naphthalene.

All in all, about two-thirds of this year's 500 million gal. of benzene output will come from petroleum.

Present Complaints: Dow and Monsanto, among others, are keeping a watchful eye on the whole situation. Like many other large users of the basic aromatics, Dow and Monsanto have been irked by supply and price factors. Last fall's steel strike and the past summer's low level of steel production showed again that aromatics consumers can't depend on the steel industry's by-product coke ovens. But unlike most other chemical companies, Dow and Monsanto-which have their own refining operationsare in a position to do something about the situation.

Dow tells CHEMICAL WEEK that it is studying the feasibility of recovering benzene from certain streams of hydrocarbons at Bay City, Mich., where it has petrochemical plants and a petroleum refinery that processes crude oil pipelined from Canada.

Monsanto doesn't say publicly that it's considering a petroaromatics plant for its Lion Oil Division. But a spokesman makes it clear that Monsanto's acquisition of Lion Oil Co. "wasn't to get into the gasoline service station business."

Steel companies are still building new, additional and improved by-product coke ovens, so that their total capacity for aromatics is inching higher. One example: new ovens being installed in Jones & Laughlin's Pittsburgh Works (picture, p. 21) will increase its coking capacity 60,000 tons/month by next year.

But coke-oven capacity is no gauge of coke-oven production; and while total demand for naphthalene and BTX chemicals is increasing, more efficient steel technology is reducing that industry's coke requirements. In some new iron ore reduction processes, natural gas is used instead of coke.

If industry expectations are borne out, the situation is due to change. With gasoline at less than 2¢/lb. while styrene is at 12¢/lb., the outlook is that oil refiners will become the dominant producers of the major aromatics—and that they'll move with increasing vigor into production of styrene and other large-volume derivatives.

As Decade Starts, Profit Margins Falter

(Comparison of first six months' operating results, 1959 and '60 based on quarterly surveys by Securities & Exchange Commission and Federal Trade Commission)

	S	ALES	EARNING	GS P	ROFIT F	RATIOS
Industry Groups	(Change, first-half '59 to first-half '60)				First- First half	
Chemical Process Industries						
Chemicals and allied products	Up	1.9%	Down	3.2%	8.1%	7.7%
Basic chemicals	Up	5.0%	Down	2.0%	9.6%	9.0%
Drugs	Up	8.8%	Up	3.3%	10.3%	9.8%
Petroleum refining and related industries	Up	4.2%	Up	1.5%	9.2%	8.9%
Pulp, paper and allied products	Up	2.1%	No	change	5.3%	5.2%
Rubber and miscellaneous plastics products	Down	0.4%	Down	7.3%	4.2%	3.9%
Primary nonferrous metals	Down	0.3%	Down	8.7%	6.5%	5.9%
Products of stone, clay, and glass	Down	1.6%	Down	16.7%	8.0%	6.8%
All Manufacturing:	Up	4.6%	Down	7.0%	5.1%	4.6%

New Reading On Profit Dip

The fall-off in profitability—noted last month in many companies' operating data—turns out to range from 2% to 10% for the chemical process industries during the second quarter.

These drops—stemming from price weakness in certain key product lines (CW, Sept. 3, p. 21)—are enumerated on an industry-by-industry basis in a quarterly compilation, out this week, by the Federal Trade Commission and the Securities & Exchange Commission.

Typical of the trend: the nearly 8% dip in second-quarter earnings for makers of chemicals and allied products, despite the fact that their second-quarter sales total was within 1% of their all-time peak volume in last year's second period. For all manufacturing industries (except newspapers), April-May-June sales were down by only 0.3%, but profits slumped by 16%.

Second-Quarter Sag: The big drop in profit ratios during the spring quarter is somewhat eclipsed in sixmonth totals (table, above) by virtue of first-quarter earnings this year running ahead of last year's.

In most cases, this year's secondquarter earnings were up from firstquarter nets, but decidedly not in proportion to the rise in sales. This, of course, is directly counter to the leverage principle that an increase in sales volume should be accompanied by a relatively small increase in overhead and other expenses and by a relatively larger climb in profits.

Drag on Drugs: However, one CPI segment—the drug industry—suffered a double setback in the second quarter. Sales were down by 5% from the first quarter, and profits toppled by nearly 18%. The second-quarter '60 vs. second-quarter '59 comparison: sales up by \$53 million, but earnings down by \$4 million.

Producers of basic chemicals also showed higher sales—up \$86 million to more than \$3.3 billion—in the second three months of this year than in the comparable quarter a year ago. Yet net earnings after taxes were down by \$26 million, to \$302 million.

Among other CPI segments, petroleum refiners nearly equalled last year's second-quarter profits, but this feat required a more than \$400-million rise in sales.

Faster Foam Growth

Last week's acquisition of Dyna-Foam Corp. (Ellenville, N.Y.) by Sun Chemical (New York) foretells more vigorous market development and competition in foamed polystyrene plastics—a field that may mushroom to 50 million lbs./year in '62 and to 200 million lbs. by '65.

Dyna-Foam-which specializes in extruding the foamed product in films and laminations for packaging and other applications (CW Technology Newsletter, Aug. 13)-is a small concern just ready to move from research and development to commercial operations. It stands to gain financial and marketing aid as a unit in Sun's newly formed Packaging Materials Group. This group-to be headed by corporate Vice-President Eugene Jacobson-will also include Sun's Facile and Electro-Technical divisions, which produce laminations of plastics, glass fiber, foil and synthetic textiles.

Big and Little Rivals: Through Dyna-Foam, Sun Chemical will be competing against 40-50 other companies, large and small, in finding applications and winning markets for foamed polystyrene film. Among these contenders:

- Monsanto Chemical a major producer of polystyrene resins— which recently brought out its Santofome film (CW Technology Newsletter, Aug. 6).
- Scott Paper, which is just starting to build a plant for production of plastic drinking cups made from a laminate of foamed polystyrene on the outside and conventional polystyrene on the inside.
- A host of smaller concerns, such as Expandex, Robinson Mfg., and Sullifoam.

(Dow Chemical, a principal resin producer, does not make the film.)

Aside from Scott—which so far is concentrating on its "hot cups" for coffee vending machines and in other uses—these companies are stressing the material's advantages for diverse applications. They note that it has been cleared with the U.S. Food & Drug Administration for food packaging, call it competitive with paper in low price, and add that it is light, flexible, waterproof, greaseproof, and that it has good insulating and cushioning properties and can be printed

or coated. Dyna-Foam is showing samples of colored gift wrapping made of polystyrene foam laminated to paper, and samples of all-plastic, disposable cups, plates, bowls, table-cloths and place mats.

Lightweight Insulation: A second major form in which foamed polystyrene is picking up sales volume is in blocks and boards of various sizes for insulation in buildings and refrigerators. Properties claimed in these applications include light weight (as little as 1.1 lbs./cu.ft., compared with about 60 lbs./cu.ft. for conventional polystyrene), high thermal efficiency and high moisture resistance. It can be made self-extinguishing, and is said to have good strength and structural stability.

Among the leaders in this field are United Cork with its Unicrest, Armstrong Cork with Armalite, Koppers Co. with Dylite, and Dow Chemical with Pelaspan.

A somewhat different approach led Monsanto and St. Regis Paper to form a joint subsidiary to produce Fome-Cor, a laminated material made by sandwiching polystyrene foam between two layers of kraft paper. Its present and potential applications: packagings, signs and displays, outdoor shelters, toys, and backing for auto door panels.

Buildings and Buoys: For the future, producers of polystyrene foam are looking to a wide range of new and potentially big-use applications. One possibility: as a backing for aluminum siding and as a filling for aluminum sandwich panels in buildings. Also, producers say, its water resistance and buoyancy make it ideal for marker buoys, life preservers, pontoons, docks and rafts. Higherdensity moldings can be adapted to underwater applications.

Among the leaders in the technology of foamed polystyrene: Germany's Badische Anilin- & Soda-Fabrik, and Koppers, Monsanto and Dow in the U.S.

With these basic producers carrying on continuing research and development programs to expand total styrene and polystyrene markets, and with numerous other companies working on end-product marketing, industry leaders feel a sales volume of 200 million lbs./year by '67—with about 50% in the various packaging materials—is a good bet.

Two Down in Spain

The Spanish government has turned thumbs down on proposals of two foreign companies to build major petrochemical projects. The decision had been foreshadowed this summer when Dow's joint venture with Unión quinesa) won the government's ap-Química del Norte de España (Unproval.

Spain's refinery capacity is mounting, but the petrochemical market is considered too small to support more than one diversified plant. As a result of Spain's easing up on foreign investment regulations, a race to build that one plant started between Dow, Standard Oil of New Jersey and Royal Dutch/Shell.

Dow's proposal was for the smallest project—a \$10-million plant to produce ethylene, propylene, and butadiene. Jersey Standard's proposal called for an initial investment of \$10 million, to be expanded to \$26 million. Shell's plan envisioned a \$56-million project.

Dow's partner will be Unquinesa, in which Dow will buy half interest through newly issued stock. The basic materials from the new project will be used captively, Dow says, for making "A wide range of chemicals and plastic materials, such as polyethylene, polypropylene, polystyrene and others."

The relatively small size of Dow's project apparently worked in its favor. In rejecting the two big bids, the government holds that it had already approved two projects and that there is no room for more—and that prospects for exporting are doubtful.

Besides Dow's plant the government has approved another petrochemical project—reportedly to be built by INI, the government industrial agency, at its Pueryollano refinery. After INI's petrochemical ambitions became known, the whole situation became a vital test of Spain's attitudes toward private foreign investment.

Business observers considered it a chance for Spain to prove it really meant what it said in its new foreign investment law. Turning down all of the private proposals in favor of INI would have discouraged potential foreign investors. This may have been a factor in the government's decision that there is room after all for two projects in the "one-plant country."

Morocco Builds a CPI

The Moroccan government will invest \$50 million to establish a chemical industry at Safi, an Atlantic seaport, by '63,

The money will be used to initiate a series of projects that will enable Morocco to process mineral resources - especially phosphates - locally for export. Prime reason: although Morocco exported 7 million tons of phosphates last year (value: \$68 million), its volume of exports dropped during the first six months of this year because of increased foreign competition.

Because the manufacture of fertilizers would increase fourfold the value of phosphate exports, the Moroccan State Development Organization will initiate the program by setting up a \$24-million plant at Safi capable of producing 1,200 tons/day of sulfuric acid and 440 tons/day of phosphoric acid.

In a second move, the Moroccan government (through the State Development Organization, which will hold minority shares) has made an agreement with the Royal Dutch/-Shell Group for the construction and operation of an \$18-million ammonium phosphate plant at Safi. The unit will have a capacity of 110,000 tons/year and is scheduled for completion by '63.

The government-through the Moroccan State Phosphate Monopolyis also studying bids (which close Sept. 30) for a contract to build and operate a \$7-million triple-superphosphate plant with a capacity of 200,000 tons/year.

The Economy Minister has disclosed that decisions have been made for the development of Safi that would involve a new port, railway facilities and a pipeline (scheduled for completion by '62) to bring natural gas 75 miles north from Essacuira (formerly Mogador).

At the same time, the State Mining Research Office has intensified its search for pyrite in the Safi region. SMRO reported the discovery this year traces of copper pyrites near Djebilets, 40 miles east of Safi. Experts think such deposits would provide the necessary copper pyrites concentrate for the Safi complex.

Also discovered were important reserves of pyrrhotine in Kettara, 70 miles east of Safi, and other pyrrhotine deposits in the Djebilets region. These would provide an estimated total of 7 million tons of pyrrhotine for the Safi projects.

The Moroccan Mining Research Office has also revealed the discovery of potassium deposits in the Khemisset area, 40 miles east of Rabat. Reserves were described as "enorous." A French company, Mines Domaniales de Potasse d'Alsace, and the Moroccan government are in the process of setting up a new company for the exploitation of these deposits.

Rubber Makers Unite

Fourteen synthetic rubber producers in the U.S., Canada, England and West Germany have formed the International Institute of Synthetic Rubber Producers. Companies in Italy and Japan may join later.

Object of the new group: to provide "a forum in which manufacturers may develop and exchange information to encourage scientific advances within the industry and . . . international trade in synthetic rubber." Membership is open only to manufacturers. Separate sections are being established for firms whose primary interest is general or special-purpose synthetic rubber, or synthetic latex.

The group's activities will be carried on through technical, traffic, packaging and statistical committees.

Managing director of the group is Bancroft Henderson, formerly president of American Synthetic Rubber Corp. Thomas Cubbage of Phillips Chemical Co. is president.

Charter members of the U.S. include Firestone, Goodyear, U.S. Rubber, Goodrich-Gulf Chemicals, American Synthetic Rubber Corp., Copolymer Rubber & Chemical Corp., General Tire & Rubber, Phillips Chemical, United Carbon, and Shell Chemical.

Members from outside this country: Polymer Corp. (Canada); International Synthetic Rubber Co., and Shell International Chemical Co. (England); and Chemische Werke Huels (Germany).

Representatives of ANIC (Italy) and Japan Synthetic Rubber Co. also attended the organizational meeting last week, although their boards of directors have not yet approved their joining.

Push Without Patents

Confusion over polycarbonate patents isn't limited to the U.S. (see p. 78). It has also muddled the picture in Japan, where three producers are going ahead with plants-evidently without the cross-licensing protection General Electric and Bayer covered themselves with in the U.S.

Original processes are claimed by all three producers-Idemitsu Kosan, Edogawa Chemical, and Teijin Kasei, joint-affiliate of Kunoshima Chemical and Teikoku Rayon.

Idemitsu has just started up its 1-ton/day pilot plant at Tokuyama, and hopes to start commercial production by '62. Like the other Japanese producers, Idemitsu has applied for patents on its process, which it savs uses bisphenol and phosgene, but does not conflict with the Bayer process because it uses a different solvent.

But Idemitsu still has not received a patent. Neither has Edogawa Chemical or Teijin Kasei. A year ago one of Teijin's parents, Kunoshima, started operating a 1-ton/day pilot plant on the Mihara plant site of the other parent, Teikoku, using Teikoku's personnel.

Although they claim to have their own phosgene process, both Teijin and Edogawa recently signed licensing agreements with Bayer, which also has patents pending in Japan. Both Japanese companies explain that they need Bayer technology for commercialscale production.

Nevertheless, they are not waiting for Bayer's patent status to clear up. Teijin is now building a 150-tons/month plant at Teikoku's site at Matsuyama, on Shikoku Island. And Edogawa is expanding its Osaka plant from 1 ton/day to up to 45 tons/month by November, and plans to boost capacity to 150 tons/month when the government approves its licensing agreements with Bayer.

Some observers suspect that both companies' processes are actually patterned after Bayer's, and that they started pilot production without Bayer's O.K. All three refuse even to outline their phosgene processes; patents are pending since '58.

Right now Japan's polycarbonate market is tiny. The Japan Plastics Assn. says imports are running at about 5 or 6 tons/month from Germany and the U.S.





Round it goes: electric train gaming wheel is feature of Enjay booth, one of large number of chemical exhibits.



Few equipment makers: Vibra Screw has machines small enough to fit space; most exhibitors showed chemicals.

New Show Theme: Chemicals for Chemists

Hampered by Hurricane Donna, the Pennsylvania Railroad strike and cramped quarters in New York's Statler Hilton Hotel, the first Chemical Exposition U.S.A.—held in conjunction with the just completed 138th national meeting of the American Chemical Society—drew 134 exhibitors and 17,000 visitors.

Dow Chemical—whose exhibit never got to New York at all—gamely manned an empty booth (and got some inquiries) until management decided to call off its part of the show.

Unlike the big Chemical Industries Exposition (Chemshow) held in New York's Coliseum in alternate Decembers, last week's exhibition was heavy on chemicals rather than equipment. What equipment was shown was mainly for laboratories, with some smaller plant items such as pumps. In fact, the mazelike exposition space in the Statler Hilton was too small to accommodate larger equipment; besides, the ACS delegates—mainly

in research and education—weren't considered likely equipment-buying prospects. The show's management, however, sent out extra invitations to purchasing agents and other executives, expected up to 5,000 non-ACS visitors, plus most of the 13,071 conventioners.

Among the larger chemical companies, the only participants were Allied, Eastman, Enjay, Monsanto and Stauffer (besides Dow). Nonparticipants had a variety of reasons: they were waiting to see what sort of results the new show achieved for others; they had problems getting organized for it; or they simply didn't think it would do them any good. Some exhibitors, including Allied and Monsanto-admitting that they were there mainly to show support for ACS-set up attractive not-hard-sell displays, expecting no concrete results. Says Allied: "We probably wouldn't be any worse off for not having been here."

Other companies expected to make contacts that would lead to sales. Many considered this a good opportunity to reach researchers and others whom salesman usually can't readily get to. The few equipment makers there generally said that since their products made new processes possible, they had to discuss their products with the lab people.

Few booths had gimmicks. One of the most popular of those that did was the Enjay display, which used a model electric train as a wheel of fortune; winners received model tank cars.

The show, sponsored by ACS's New York Chapter, probably will be set up every third year—whenever the national meeting is held in New York. This means that the next show, in '63, will go on just a few months before the '63 Chemshow. But ACS show officials say this isn't a problem, that their show appeals to a different audience.

COMPANIES

Wallace & Tiernan (Belleville, N.J.), diversified chemical, pharmaceutical and instruments manufacturer, will merge with the R. J. Strasenburgh Co. (Rochester, N.Y.), privately held pharmaceutical manufacturer, in an estimated \$26-million transaction. Under merger terms, Strasenburgh stockholders will receive 400,000 shares of W&T common upon ratification by stockholders of both companies.

Olin Mathieson Chemical Corp.'s Winchester-Western Division has begun production of the Army's new M14 rifle at New Haven, Conn. With a new production line having more than 600 machines including multiplestation equipment, WW has contracted to produce 116,-500 of the new lightweight semiautomatic/automatic rifles for a total of about \$8 million.

Whitehouse Plastics Corp. (Bakersfield, Calif.), major producer of pleasure boats, will merge with Lunn Laminates (Huntington Station, N.Y.), producer of glass-fiber-reinforced plastic products. Terms: Whitehouse will issue 732,275 shares of its common stock for the 813,639 shares of Lunn common now outstanding; Lunn will become a division of Whitehouse and will serve as its Eastern outlet.

Engelhard Industries (Newark, N.J.), diversified producer of metals and chemicals, is now listed on the New York Stock Exchange under the symbol ENG. The company—whose shares were first offered to the public in June (CW, April 9, p. 25)—is the world's largest refiner and fabricator of platinum metals. Last year's sales: \$125 million.

National Gypsum Co. has acquired Allentown Portland Cement Co. in an exchange of stock valued at \$31 million. National will exchange 584,289 shares of its common stock for all outstanding shares of the Allentown, Pa., firm. National thus boosts its cement-making capacity to 16.5 million bbls./year.

EXPANSION

Plastic Films: Reynolds Metals Co. (Richmond, Va.) is nearing completion of a \$1-million expansion-modernization program at its Grottoes, Va., plant. Aim: to double production of oriented polyvinyl chloride film, a heat-shrinkable film used to provide skintight overwraps, and of water-soluble polyvinyl alcohol films, used to package detergents and other household laundry products.

Styrene Monomer: A local building permit last week indicated that the styrene monomer plant being built by Badger Mfg. Co. (Cambridge, Mass.) for Sinclair-Koppers Chemical at Houston, Tex., will cost about

\$12 million. This plant—scheduled for completion by mid-'61—will have an annual output estimated at 70 million lbs./year.

Organic Chemicals: Allied Chemical's National Aniline Division is planning to build a unit with greater capacity to replace the three-story brick structure recently destroyed by a \$1-million explosion at its plant at South Buffalo, N.Y. Technical changes will improve yields and increase production of benzene, methyl alcohol, dyestuffs, photographic chemicals and pharmaceutical intermediates.

Enamel Paper: Consolidated Water Power & Paper Co. (Wisconsin Rapids, Wis.) will spend \$8 million to expand enamel paper production to 300,000 tons/year at its Wisconsin River Division (Whiting, Wisc.). Feature: a new paper machine in operation by next year with capacity of 25,000 tons/year.

FOREIGN

Acrylic Fiber/England and France: Courtailds Ltd. will increase its production capacity for its Courtelle acrylic fiber from 12 million lbs./year to 42 million by '62. Completion of its new French plant at Calais will account for 10 million lbs. of that total.

Chlorine, Caustic/Germany: A German mining company, Preussag (Hanover), and a Dutch chemical company, N. V. Koninklijke Nederlandsche Zoutindustrie (Hengelo), have formed a joint subsidiary, Elektro-Chemie Ibbenbueren GmbH. It will operate a chlorine-alkali electrolysis plant. The Dutch firm will supply industrial salts for processing; Preussag will provide the electric power.

Chemicals/Germany: Dr. Jacob Chemische Fabrik GmbH., 34-106 Planigerstrasse, Bad Kreuzmach, Germany, manufacturer of chemicals including carbon disulfide and thiocyanogen salt, is seeking a license to produce a line of U.S. chemical products or finished chemical products from imported raw material.

Liquid Ammonia/Denmark: Dansk-Norsk Kvaelstoffabrik, a new chemical company, will build a \$15-million plant at Grenaa on the east coast of Jutland. It will produce up to 10,000 tons/year of liquid ammonia and 75,000 tons/year of ammonium-potassium fertilizer.

Chemicals/Italy: Pending U.S. Securities & Exchange Commission approval, Montecatini (Milan) plans to offer more capital stock in the U.S. It will offer additional American shares to its U.S. stockholders on a basis of four new shares, at about \$16.13/share, for each 11 American shares now held. Subscription period: Oct. 10-28.



Brush's Mikhalapov: Key to growth is improvement in processes.

Brush Pushes for Profits

When Brush Beryllium Co. reorganized its corporate structure late in August, it was implementing fundamental changes in the company's way of doing business. In effect, President George Mikhalapov told Chemical Week last week, the company is shifting gears to keep up with fast breaking developments in the beryllium industry as a whole.

Brush is one of two major producers—the other is Beryllium Corp.
—of beryllium metal and beryllium copper alloy, is the larger and more dynamic of the two, say industry experts. Brush is a good example of companies that make exotic products, get a military push and go from there to find broad commercial markets—a major problem to many companies in today's defense-dominated economy.

New Growth: Now the beryllium industry — whose products go into atomic reactors, sensitive instruments, wire, and structural components for missiles—is knocking at the gate of new growth. Key to the gate Mikhalapov believes, is reduction in the price of finished beryllium products to the final consumer. "But we don't need a spectacular breakthrough to cut that price drastically. What such a reduction does require is a lot of improvements in processes and handling."

Right now beryllium costs about \$50/lb. as a vacuum cast ingot. Of that about \$9 represents the cost of ore. There's obviously a sizable leeway for cutting costs in the finishing processes. In addition there's a wide search on for more abundant ore reserves than the traditional pegmatite, and ore refining processes are

getting wide research attention. If costs can be lowered sufficiently, and the metal produced in larger quantities, beryllium experts think it may find wide markets in aircraft building and perhaps as a rocket fuel.

Brush Shift: To track down these possibilities and get a sight on the markets, Brush has taken a topsy-like organization and decentralized it to give management wider scope and more responsibility. Mikhalapov sums up the company's background: "In our early days we were primarily a research and development organization. Then during and after World War II, we got heavily into cost-plus government work, which exceeded our commercial operations." Under such conditions, management tended to concentrate in a small group of men.

The balance of Brush's business has shifted now. In '55 annual sales were \$4.5 million, by '59 they had jumped to \$18 million; '60's first-half sales were \$13 million. From this growth four distinct areas of corporate activity emerged, all largely independent of the others—and it was these areas that have been formalized in the reorganization.

Facilities, meanwhile, have been expanded in all directions. Company capacity will virtually double next year compared with '59. The increased volume has enabled Brush for the first time to begin taking advantage of mass production techniques, opening the door to many process and methods improvements.

Too Harried: "Our small group of key management people just couldn't be everywhere they were needed," says Mikhalapov. The decision was made a year ago to decentralize the company's operations into "more manageable units without going over completely to the product type of structure." The units:

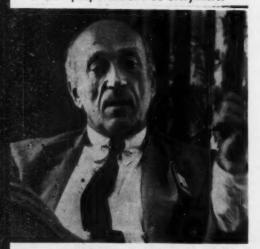
• Elmore Division, in which production of semifinished raw materials for the entire company is centered. A \$6-million expansion at the division's plant near Toledo will increase vacuum-cast beryllium billet capacity from 12,500 lbs./month to about 25,000 lbs. Beryllium hydroxide capacity is being upped from 35,000 to 60,000 lbs./month of beryllium content. Beryllium copper master alloy capacity stays at 10,000 lbs./-



'In our early days we were primarily in research and development.'



'Our small group of management people couldn't be everywhere.'



"We've created more positions with broad managerial responsibilities."

month beryllium content.

• Fabricating Division, which makes and sells fabricated beryllium products. The company opened its new \$400,000, Hayward, Calif., plant in July and has been greatly expanding its Cleveland plant.

• Pennrold Division, which rolls and fabricates beryllium copper and other alloy strip products. This operation has just been moved from Reading, Pa., to a new plant in Shoemakersville, Pa., which about doubles the division's capacity.

• The Sales Division, which is headquartered in Cleveland, plays its role in the marketing of products from the other divisions.

Management Obligation: The new reorganization puts the obligation for efficient, profitable operation of each division squarely on the shoulders of each division manager, has broadened the managerial scope of several positions.

"Our present structure is a compromise," Mikhalapov comments.
"The volume of our business would not quite stand two or three parallel forms of management immediately and we need time to let our executives show us what they can do in broad managerial jobs."

For the time being, research and development will be centered under the management of the Elmore Division. Other services, such as accounting and personnel, will be available from a single source, although each division will have cost and profit centers of their own.

Sales Effort: The sales effort in the new organization is another compromise. In time, each of the consumer product divisions will have separate sales forces. For the present, the Fabricating Division will handle its own "routine" sales. Pennrold and Elmore will market products through the Sales Division.

A central sales group in the Sales Division will develop new beryllium applications, sell fringe products, such as beryllium oxide, which don't fit into the pattern of any other division and will handle the sales of new products until they develop sufficiently to put them in the hands of the operating divisions or until new operating divisions can be formed. The Sales Division will also handle advertising services and will keep an eye on the sales efforts of the various divisions and re-

port to the president on their progress.

Outlook: Through process and handling improvements, the company has brought prices of finished beryllium products down each year. In '58 the average price was over \$250/lb. In '59 it was \$170; this year it may hit \$150. "Bringing the ultimate cost of beryllium parts to \$50 or \$60/lb. is much in the picture in the next few years," says Mikhalapov, "although I hesitate to try to pinpoint the time any more exactly than that."

"Beryllium will never be cheap," he continues," so it will only be used where its exceptional properties are really needed. Even at \$20/lb. and a 2,500-tons/year consumption, you've got a \$100-million industry. At 25,000 tons/year, you've got a \$1-billion industry, and that's just about enough metal to cover the real applications."

Tying Pension to Profits

Baxter Laboratories, Illinois maker of pharmaceuticals, last week revealed what it considers to be a new approach to pension plans. In effect, Baxter's new plan gives company retirees a share in company profits as part of their retirement pay, while guaranteeing them a minimum pension.

The company's contributions toward pensions would be in the form of Baxter common stock. The company will contribute a minimum of 6% of its profits before taxes to the plan; it will give more if needed to provide for minimum contributions based on the pension portion of the plan. The company reports that more than 91% of Baxter employees have signed up for the plan.

As their contribution, employees give 2% of their monthly earnings that are subject to social security taxes and 4% of the remainder of their salary. The employee contributions will be invested in "a diversified list of stocks and bonds."

While separate features of the Baxter plan are not unique in themselves, insurance and pension experts agree that the combination of investments—particularly a company's contribution of its own stock—is an innovation.

Baxter says that if a participant's account in the plan at retirement is more than enough to provide the minimum benefit, the excess will be



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needs 'em. Another big use of phthalate plasticizers made from Tridecyl Alcohol is the manufacture of high temperature vinyl insulation for the electrical industry. For complete information, contact the nearest Enjay office. Home Office: 15 West 51st Street, New York 19, N. Y. Other Offices:

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used to increase the monthly retirement income. If the account value is not enough to provide the minimum, the company will make up the difference. The latter feature provides a floor under the retirement benefits. There is no ceiling, however, to the profit sharing features.

Baxter's contribution is credited to participants' accounts each year on a sliding scale based on length of service and participants' deposits during the period.

Baxter considers the program well tailored to employee and company needs. It's current labor force is "youthful"; consequently, there's ample time for equities to build up before there will be any strain on financing. Baxter considers the plan a boost to employee morale, as well as a prestige builder for the company. Moreover, Baxter tell CW, it should make it easier to hire quality people—and keep them.

The plan is part of an over-all new employee benefits program that Baxter has drawn up to replace some 32 plans it has accrued over the years. The new four-point program also covers death, disability and medical care benefits.

Rising Oil Pressure

In the oil industry, pressure—and publicity—is mounting over forthcoming contract negotiations.

The Oil, Chemical & Atomic Workers union last week reported that the necessary three-fourths of the petroleum bargaining units have ratified OCAW's bargaining program this year calling for an 18¢/hour general wage increase. This means that no oil bargaining unit may sign a contract for a lesser amount without prior approval of OCAW's Bargaining Policy Committee.

In secret balloting, the locals also approved strike authorization if necessary to enforce the wage demands. Locals have been notified to open their contracts and begin negotiations immediately. The union says that "shortly after Dec. 1, all contracts affected by the program will be open, and the union will be in position to strike, if necessary."

Elsewhere in the industry, the National Independent Oil Workers Union is preparing for negotiations for a nationwide wage increase.

At the Casper, Wyoming, refinery of Standard Oil Co. of Indiana last week employees voted 189-123 in favor of striking to back up the union's demands, if union leaders require it.

The employees' old contract expired in May and negotiations have been under way since last February. The independent represents employees in six refineries throughout the nation. The union is asking for a 6% general wage increase and a 6% improvement in fringe benefits.

LABOR

Allied Strike: In contract negotiations at Semet-Solvay's (division of Allied Chemical) Ironton, O., plant, a federal mediator has failed to get agreement between management and Local 10-522 of the Oil, Chemical & Atomic Workers Union. The union is seeking a 20-35¢/hour increase, according to various job classifications, and has turned down a company offer of a 16¢/hour increase over a two-year period. The last strike at the plant, in '58, lasted 17 weeks.

Columbia-Southern Contract: Local 4153, OCAW, and management of the Columbia-Southern Chemical Corp. at Corpus Christi, Tex., have agreed on a new three-year contract that includes a 4% general wage increase with a minimum increase of 10¢/hour. It also provides for several wage adjustments in particular jobs, an increase in hospitalization insurance benefits, and other fringes. An additional wage increase of 3% will be effective at the end of the first year of the new contract, and another at the end of the second year.

Jefferson Strike: Employees at Jefferson Chemical's Port Neches, Tex., plant, represented by Local 4-228, OCAW, were still on strike last week over the case of a discharged employee. A clerical group has accepted the company's proposal to submit the matter to arbitration, but maintenance and operations employees have rejected this proposal. The discharged employee is accused of attacking a truck driver earlier this summer during a 73-day strike. This is the third strike the company has suffered this year; supervisory employees are op-

erating the plant at about 60% capacity.

Engineer Union Blow: In a strong blow to nationwide unionization of professional employees, engineers and technicians of the Sperry Gyroscope Co. have ousted the Engineers Assn. as their bargaining agent. The Assn. recently joined the International Union of Electrical Workers. The election was run by the National Labor Relations Board at nine Sperry plants in New York City and on Long Island. The vote was 1,723 to 1,509.

It's the second massive blow at engineers' unions. Last May, 6750 engineers employed by Western Electric company voted to bar certification of the Council of Western Electric Professional Employees-National, as their collective bargaining unit.

Varcum Contract: Management of Varcum Chemical Corp. division of Reichhold Chemicals, Inc. at Niagara Falls, N. Y., and Local 15-309 OCAW, have agreed on a new two-year contract. The agreement calls for a wage increase of 8¢/hour, a ninth paid holiday in the second year of the contract, and a pension to be paid in full by the company. Also included: are liberalized health and medical plans.

Stauffer Settlement: United Mine Workers, District 50, and management of Stauffer Chemical Co.'s, Niagara Falls, N. Y. plant have signed a two-year contract. Provisions: a general wage increase of 9¢/hour, a ninth paid holiday effective the second year of the contract, and an additional 5¢/hour increase for Sunday work.

Cyanamid Strike: As of press time, the strike of 475 employees represented by Local 4603, Oil, Chemical & Atomic Workers Union against the Fortier, La., acrylonitrile plant of American Cyanamid was still unsettled. No contract has been in force since late July when the former three-year agreement expired; workers went on strike at the end of August. Union is seeking a one-year contract, revised schedules for daylight workers, and "improved working conditions." Cyanamid says the basic issues are wages, and retention of management operating rights.



"One more step toward a \$30-billion goal —built by Badger."

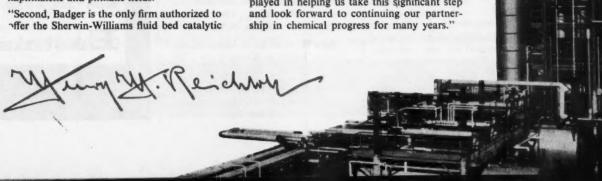
The demand for larger quantities of plastics at lower prices is growing. In a short time the industry could have sales of \$30-billion annually. Building new plants to produce better products at less cost is another step in reaching the goal; and in taking that step Reichhold is proud to be associated with Badger.

"We awarded Badger the contract for engineering, design and construction of our new 30million/lb/yr phthalic plant at Elizabeth, N.J., for a number of reasons: Badger had the experience — more than anybody else — in the naphthalene and phthalic fields.

process - a process to which Badger has contributed a number of refinements. This process design has given RCI many design advantages among them low capital and operating costs, better yield, flexibility, highest product quality and safety.

"Operation of the plant so far indicates that it will easily meet or exceed design capacity. With this new plant added to existing facilities, we will be producing approximately 16% of the nation's phthalic output.

"We thank Badger for the important part it played in helping us take this significant step and look forward to continuing our partnership in chemical progress for many years."



LEGAL

FTC Tool: The Federal Trade Commission, backed up by the Justice Dept., is fighting a number of government agencies in its struggle to get a new trustbusting tool: access to "confidential" reports submitted by companies to the Bureau of the Census. If FTC is successful, it could mean that CPI firms would have to hand over these full reports on company activity and market shares. whenever the firms were under FTC attack. But there's intramural opposition, and the Supreme Court has been asked to decide if FTC's goal is legal.

The Census Bureau, the Commerce Dept. and the Bureau of the Budget all maintain that the interests of the government would be damaged if FTC could demand "confidential" census information. They contend that such FTC power would adversely affect the honesty of the reports and throw the entire governmental statistical reporting system out of line. At present, the release of the information is prevented by law.

FTC Probes: Meanwhile, FTC is kicking off the fall season with increased activity in the food and drug fields. These developments came to light this week:

- FTC monitors will examine television and radio advertising, watching for misleading claims, including unfair medical "endorsement."
- Claims for arthritis and rheumatism cures will continue to get special attention.
- The commission will push to extend its jurisdiction over drugs advertised interstate, even though sales may not involve interstate commerce.

FTC Chairman Earl Kintner says that at the beginning of this fiscal year, the commission had more than 1,200 pending investigations of deceptive advertising practices—about a quarter of them in food, drug and cosmetic fields. FTC, Kintner says, will move at an "accelerated" rate in this field.

FTC Settlement: The lengthy hassle over battery additive advertising seems to have reached an end. Pioneers, Inc. (Oakland, Calif.) and its president, Jess M. Ritchie, have agreed to a Federal Trade Commission order preventing the advertising of the company's "AD-X2" battery additive as

being approved or tested by FTC or the government. The company was charged in an FTC complaint last March with illegally making such claims in newspaper and periodical advertising. The consent agreement signed by Pioneers does not constitute an admission of a law violation by the company.

KEY CHANGES

Richard F. Brown to vice-president, sales, Robert L. Duncan to vice-president, product marketing. Thomas R. Miller to vice-president, research and development, Arthur P. Moss to vice-president and works manager. Union Carbide Chemicals Co., division of Union Carbide Corp. (New York).

S. D. Breitweiser to president, Harry A. Brown to senior vice-president, Suntide Refining Co., Glenn E. Wynn and T. E. Fitzgerald to top executive offices, Sunray Chemical Co., both companies, subsidiaries of Sunray Mid-Continent Oil Co. (Tulsa, Okla.).

Stanley A. Merrill to board of directors, Purepac Corp. (New York).

Peter J. Kornett to board of directors, Oakite Products, Inc. (New York).

Thomas J. Teare to president, Plasbond Corp., associate company, Cutter Laboratories (Berkley, Calif.).

A. T. Zodda and Fred J. Stock to corporate vice-presidents, Olin Mathieson Chemical Corp. (New York).

Frank S. Capon, F. G. Raymant, H. F. Hoerig to vice-presidents, Du Pont of Canada, Ltd. (Montreal, Que.).

Philip H. Augerson and Robert F. Dawson to vice-presidents, Dyna-Therm Chemical Corp. (Culver City, Calif.).

Harry W. Rudel to vice-president, Syntex Laboratories, Inc., division of Syntex Corp. (New York).

Colin Brown to vice-president, corporate development, The National Gypsum Co. (Buffalo, N.Y.).

John W. Pool, Jr. to vice-president, Plastics Division, Koppers Co., Inc. (Pittsburgh).

Paul W. Neidhardt to vice-president, and board of directors, The Glidden Co. (Cleveland).

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"The customer was wrong...but we were right on time"

...recalls production supervisor, Acid Division

"It started with a phone call from one of our regional sales managers asking about a tank car of acetic anhydride that hadn't arrived at the customer's plant.

"Seems they were in full production on their line of antibacterial drugs. Anhydride supplies were running low and the purchasing agent was getting pretty uneasy.

"Well, we turned to the files to see what had happened, but we couldn't find the order. So we searched again and then we re-searched. Found an old office procedure we never knew we had—but not a trace of the order.

"Our sales office called the purchasing agent back and with considerable embarrassment told him we had looked high and low but simply couldn't find any record of the order. The purchasing agent comes back with—'Of course you couldn't find the order. One of our ex-employees forgot to mail it. It's still here in the office.'

"Then he told us their production units would have to shut down if they didn't get delivery by 8:00 A.M. on the second morning. Could we help them out.

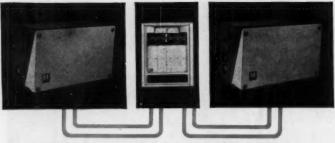
"By this time the day was well along and our loading crew had already gone to dinner. We located two tank trucks in a hurry and recalled the crew who loaded the anhydride (that's me leaning on the clipboard) and had sample analyses run immediately. With the help of our friends over at the Mason-Dixon truck terminal the shipment went out that night.

"The trucks had sleeper cabs and two drivers. Driving night and day, they covered the run of more than 800 miles in time to arrive at the customer's receiving platform the next night—well in advance of our customer's deadline."

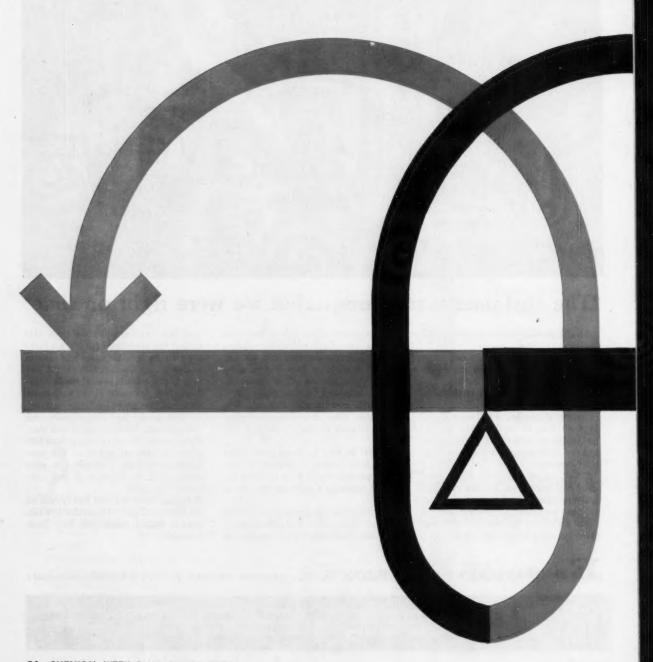
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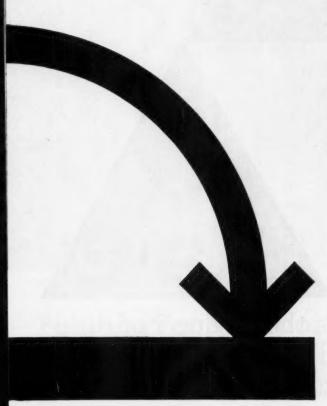
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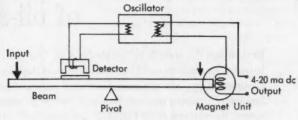


Tel-O-Set's force-balance feedback system. This system, used as the basic circuit in Tel-O-Set transmitters, receivers, controllers, and other instruments, has proved itself in thousands of installations in the last five years. The force-balance feedback circuit increases the accuracy and dynamic response of the system by decreasing hysteresis effects and sensitivity to changes in ambient conditions.

Delicate inputs thrive on the tender care of Electrik

Observe: (1) input force (from bellows, Bourdon tube, or displacement linkage) deflects pivoted beam; (2) air-gap in ferrite detector increases, (3) producing a change in inductance in oscillator circuit; (4) a portion of output current is fed back into magnet unit, producing a force on beam which is equal and opposite to input force; feedback balances beam. Full scale motion is only one-thousandth of an inch.

The advanced control engineering seen in force-balance feedback is carried through the entire *ElectriK Tel-O-Set* System. Specifically, there's no external power required at any field-mounted *Tel-O-Set* instrument. Line power connection is made only at the receiver. Two-wire d-c transmission eliminates shielding problems. The 4-20 milliamp signal range of the system gives a live zero and permits the use of the most reliable transistors available. The d-c signals



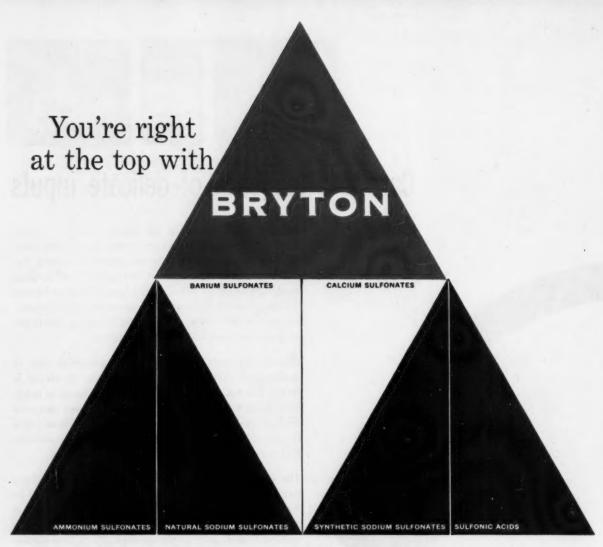
can be fed into data handling systems and millivolt-actuated instruments . . . can be easily transduced to a standard 3-15 psi pneumatic signal to operate existing pneumatic systems.

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Publicker's Glass: Leading an old-line carbon dioxide producer into direct sales and distribution.

Pointing For National Carbon Dioxide Sales

This week Publicker Industries, Inc. (Philadelphia, Pa.) is in the midst of a marketing shuffle that is putting the firm in direct sales and distribution of carbon dioxide after more than 30 years as a supplier to other marketers. Within recent weeks, Publicker made its first tank truck delivery of bulk liquid carbon dioxide, opened offices in Chicago, Cleveland and New York, and added sales staffers to go after new orders.

Publicker's goal: to gain a toehold as a marketer of all forms of carbon dioxide to all major U.S. markets.

Publicker's move adds one more competitive factor to the dioxide business, underscores the company's bid to use its fermentation-produced material to help stabilize its sales volume, boost profits. And Publicker's efforts to establish a national mar-

keting organization where none existed previously, point up the problems and challenges of "going national" with a sales and distribution program.

Long-Time Desire: Publicker's current entry into direct marketing of its carbon dioxide production is not a recently hatched scheme; Robert Glass, general manager of the program, tells CHEMICAL WEEK that the move had been in the wind for many years.

Publicker began capturing and compressing previously wasted by-product carbon dioxide (from its industrial alcohol fermentation process) during the '20s. Since that time, it has sold most of it to other producers—as dry ice or as liquid material—under the ThermIce trade-

Publicker management spotted opportunities to increase its return by selling directly to carbon dioxide consuming firms some years ago. The holdup was due to the firm's shaky raw material position.

Publicker uses molasses for industrial alcohol fermentation. But in recent years, rising prices and unstable sources of supply (primarily from Cuba) have caused Publicker problems, and have been largely responsible for less-than-capacity production and sales of industrial alcohols and related chemicals and financial losses during '59 and '58. Under these uncertain conditions, Publicker management held off plans to enter carbon dioxide marketing.

Forging Ahead: Late last year, however, things began to look decidedly better for the company. According to Glass, Publicker "firmed up its raw material commitments," figures now it can count on "continuity of supply" of molasses. The firm will buy its molasses from several sources, will also use surplus corn from the U.S. Commodity Credit Corp. (U.S. Dept. of Agriculture) at prices below the current support level.

At about the same time, Publicker augmented its production capacity by installing equipment for capturing the carbon dioxide by-product of its liquor distilling operations, built a pipeline to connect the two facilities in Philadelphia.

With these problems out of the way, Publicker went into action early this year. One of the first moves: establishment of a sales subsidiary, Thermice Corp., with Robert Glass as general manager, to handle the national marketing venture.

It's virtually impossible, of course, to launch direct sales to all major U.S. markets at the same time. For its initial effort, Publicker has selected two key areas, the Middle Atlantic-New England markets, and the highly industrialized East North Central area (Ohio, Illinois, Indiana and Wisconsin).

And since the company is going after business at all levels (from customers taking thousands of tons yearly to small accounts taking several cakes of dry ice daily) it faces a wide assortment of sales and distribution problems. Here's how Thermice is handling them.

Staffing for Sales: One of Glass's most pressing problems is that of setting up a sales staff to go after the business. Glass won't reveal how large his present staff is or how rapidly it's growing, but he does admit he will have "more than one man in each major market area." (Thermice considers a major market area to be each major city and those nearby areas that are easily served from it. Some carbon dioxide marketers call each facility across the country an outlet-even if the community is a relatively small one and the facility is nothing more than a small loading dock and a few storage boxes.)

Besides its New York, Cleveland and Chicago sales offices that are now open for business, Thermice will shortly add a Boston office, may move into other key Northeastern cities such as Pittsburgh and Buffalo. Although the sales office network is not yet complete, and Glass is still building his sales staff, Thermice is losing no time scouting leads. That's because the firm has used Publicker's established industrial alcohol and chemical sales teams to hunt leads.

When the sales organization is more completely formed, Thermice will have a district manager supervising activities in each major market reporting to the two regional managers, Robert Richards (Midwest) and Bert Lowenthal (East).

Local Storage: Another of Glass's key problems is providing for local depots to maintain inventories of carbon dioxide close to customers for quick delivery. In some instances, Thermice will use portions of Publicker-owned properties to establish these depots and storage sites; in other cases, the firm will lease the facilities or build its own.

Among the items in these depots: insulated storage boxes for cakes of dry ice, cutting and bagging equipment for handling smaller-size pieces of ice, huge horizontal storage tanks for holding liquid material at 350 psi. and equipment for converting either ice or liquid carbon dioxide into gaseous form for delivery in cylinders.

Physical Distribution: Another big problem for Thermice, of course, is moving its carbon dioxide from its two plants in Philadelphia to depots in the northeast and midwest, and to those customers equipped to receive bulk liquid material in large quantities. Earlier this month, Thermice completed its first tank trailer delivery to a customer.

Although trailers are now being used to ship liquid carbon dioxide from Thermice's Philadelphia plants to customers, this will be changed when additional tank trailers and special railroad rolling stock-now on order-are delivered and pressed into service. Specially constructed boxcars will haul dry ice to storage depots, and heavily insulated "jumbo" tank cars (capacity: 16,500 gal.) will handle the principal bulk liquid movements to the depot locations. Tank trailers will be used, mainly, for deliveries in and around the "major market areas," operating over radiuses of 300-400 miles.

Breaking In: Despite these problems of setting up a sales organization and

a distribution network, one of Glass's biggest challenges stems from the nature of the carbon dioxide business: breaking into a relatively stable producer-user pattern.

Handling and storing liquid carbon dioxide is often more economical than using it in other forms but the investment and engineering costs are high. For this reason, most liquid material is sold under long-term contracts—generally five years, and Thermice may encounter some difficulty in landing orders from customers who are already committed for their current needs.

On the other hand, dry ice is usually sold by verbal agreement—the market is flexible. Here, Publicker figures it's Thermice subsidiary should be able to boost immediate sales relatively rapidly.

At present, Glass reports that this dry ice business accounts for 70% of Thermice's total dioxide sales; liquid material represents almost all of the rest. (Gas in cylinders isn't figured in as a factor because most of it is originally sold by Thermice as either liquid or solid.)

But Glass—and other industry observers, too—note that liquid sales are gaining rapidly, will pass dry ice sales in the next few years.

What's Ahead: It is too early to guess at the ultimate impact of Publicker's foray into direct marketing of carbon dioxide. But it seems certain that the move will bring new competitiveness to the business. And Publicker's moves into the Midwest and Northeast are just the beginning.

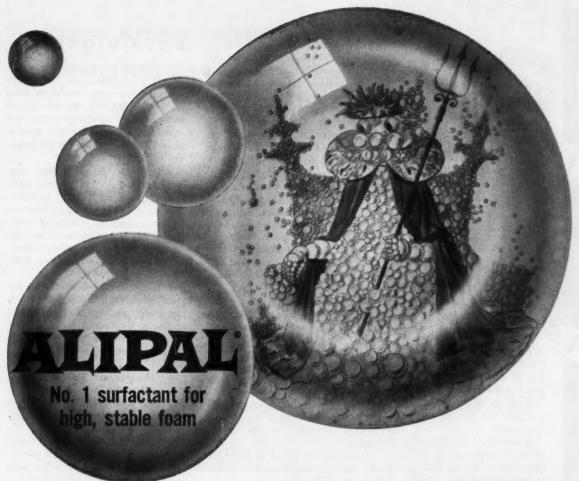
Says Glass: "Eventually, we'll be in every important market area in the country."

Weighing Strike Effects

Chemical purchasing agents and traffic managers in the East and Midwest breathed a sigh of relief last week as the Transport Workers Union and the Pennsylvania Railroad came to terms ending the 11-day-old strike.

Although the strike had caused little disruption of chemical shipments through its first 11 days, purchasing and traffic men were becoming increasingly worried about delayed or halted movements—as well as the high cost of finding alternate routes—as the strike wore on.

Be Prepared: Actually, most com-



What does it take to win first place? Usually, a lot! And Alipal anionic surfactants offer a lot to liquid detergents: good cleansing power, high wetting strength, easy emulsification, economical price - all in combination with high foaming ability. Alipal formulations are also distinguished by easy rinsing and improved drainage characteristics, mildness of odor and gentleness to the skin.

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panies contacted in a CHEMICAL WEEK spot-check reported little difficulty stemming from the shutdown of the nation's largest rail system. Traffic men diverted most shipments to other railroads or other means of transportation — largely trucks — before the strike deadline. Some of this traffic went to the B&O; the Reading Railroad reported a whopping 800% upsurge in traffic it handled during the strike.

Trucking costs proved 10-15% higher than corresponding rail costs, however.

Purchasing agents, too, were prepared for the strike. Stockpiles were augmented in many cases, and few complained of severe shortages stemming from the strike.

Stalled Chemicals: But not everyone was unscathed. In Pittsburgh, Koppers told Chemical Week that it was "hard hit" by the shutdown. Main products affected: wood preservatives and large treated wood products being shipped from the company's Oil City and Lockhaven, Pa., plants. Koppers also noted that the strike forced a reduction in purchases of treated wooden rail ties by the Pennsy.

And Pittsburgh Coke & Chemical Co. reported that it feared a truck shortage in the Pittsburgh area because of the large-scale shift of chemical cargoes away from the rails.

In Philadelphia, the story was similar: most CPI firms had little trouble, but a few had their hands full. Asphalt shipments were delayed considerably, holding up some construction work in that city. And anhydrous ammonia was likewise delayed, causing some inconvenience to users.

Coal shortages on the Delmarva Peninsula of Delaware threatened to become serious just before the end of the strike, and delayed chlorine movements to some Eastern cities forced them to plan for tank-truck delivery within a few weeks. Chlorine has been moving over the highways just since early this year (CW, March 19, p. 31).

In Cincinnati, Procter & Gamble noted it had experienced "considerable inconvenience" because of the shutdown.

All in all, CPI companies came through the strike in good condition, proving once again that it pays to be prepared.

DATA DIGEST

- Acetone: New 12-page booklet (NS-277) presents data on acetone produced by cumene oxidation. Data covered: production method, typical analysis, specifications, properties and chemistry, uses and handling precautions. Hercules Powder Co. (Wilmington 99, Del.).
- Polynosic Rayon Fiber: Brochure tells the story of modified cellulosic staple fiber. Subjects included: fiber manufacture, characteristics and physical properties, processing methods, dyeing and finishing details, and description of possible end-uses. Hartford Fibres Co. (140 Madison Ave., New York 16, N.Y.).
- Industrial Chemicals Prices: Revised price list (August '60) details the grades, package sizes and prices of fine and industrial chemicals now available from the company. J. T. Baker Chemical Co. (Phillipsburg, N.J.).
- Fluorosilicone Rubber: Folder (9-113) describes properties and performance characteristics of fluorosilicone rubber. Dow Corning Corp. (Midland, Mich.).
- Piperazines For Parasites: Eightpage booklet outlines uses of piperazines for controlling internal parasites in swine and poultry. Jefferson Chemical Co., Inc. (Houston 1, Tex.).
- Protein Hydrolysates: Series of product data sheets outlines properties and prices of protein hydrolysates used as fermentation media. Amber Laboratories, Inc. (3456 North Buffum St., Milwaukee 12, Wis.).
- Wax Services: Booklet details company's activities in technical studies relating to the wax industry. Foster D. Snell, Inc. (29 West 15th St., New York 11, N.Y.).
- Metallic Vinyl Coatings: Folder describes line of coatings for wood, metal, reinforced plastics and concrete. Among them: vinyl coatings containing aluminum. Magna-Bond, Inc. (1718 South 6th St., Camden 4, N.J.).
- Organic Chemicals: New brochure provides property and specification data on more than 200 aliphatic organic chemicals, including fatty acids, fatty nitrogen derivatives, amines and diamines. Armour Industrial Chemical Co. Division of Armour & Co. (110 North Wacker Dr., Chicago 6).

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The catalytic properties of the platinum metals, plus their corrosion resistance at extreme temperatures, enable gauzes made from these materials to be utilized as the only practical catalysts for various commercial chemical reactions.

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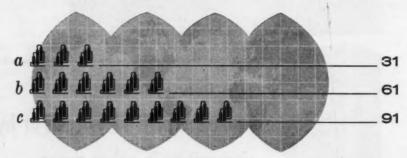
what's your best estimate?

. . a quiz for Chemical Executives who want to keep posted

QUESTION 1. According to a recent survey by the Manufacturing Chemists Assn., nearly 50% of its members are engaged in, or have an interest in, foreign operations. Can you guess what per cent of total capital outlay by U.S. chemical companies in 1959 was for plants and facilities overseas?

a \$\$\$\$\$	5%
b \$\$\$\$\$\$\$\$\$\$	10%
c \$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$	15%
d \$	20%

QUESTION 2. How many chemical and petrochemical plants has Lummus designed, engineered and/or constructed abroad since World War II?



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petrochemical plants in 11 foreign countries since 1945. Seven international members form the 2. The answer is (b). Lummus has designed, engineered and/or constructed 61 chemical and

by U.S. chemical companies in 1959 went for plants and facilities overseas.

(c) is correct. MCA reports that an estimated 15% of the money spent



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Washington

Newsletter

CHEMICAL WEEK
September 24, 1960

A new committee to coordinate the nation's space efforts has been formed by the White House. Known as the Aeronautics and Astronautics Coordinating Board, the committee has the Dept. of Defense's Director of Research and Engineering Herbert York, and the National Auronautics and Space Administration's Deputy Administrator Hugh Dryden as cochairmen.

The committee is charged with meshing the space programs of the Pentagon and NASA to avoid duplication of effort in chemical fuels research, electronics, etc., with the \$1 billion or more the two agencies spend each year for space work.

This marks the latest attempt by the Administration to get a working coordination of the nation's rapidly growing space program. Early this year two space coordinating committees established in '58 under the National Space Act were disbanded.

FDA will get a relatively clean bill of health from special investigators checking the professional ethics and performance of FDA's personnel. The investigation followed disclosures that former antibiotics chief Dr. Henry Welch made \$287,142 on the side in eight years from medical publications.

So far, investigators have not found any practices questionable enough to justify firing any one, although a number of minor practices have grown up because until recently the agency did not have a clear-cut policy on outside interests. The report originally was to be made by the end of July; now it may be at the end of October.

A six-year study of water pollution in the Chicago area is being launched by the Public Health Service. The object is to develop a comprehensive plan for controlling pollution.

A 40-man staff of chemists, engineers and biologists is being assembled to make an inventory of discharge into the Chicago River and two canals, and what effect water diversion would have. Congress has appropriated \$500,000 for the first year of the study.

Democratic criticism of a holddown on defense spending has spurred the Administration to let the Pentagon cut loose a little more of the budget increases approved by Congress.

Some \$136 million has just been okayed for "backup" component development of Lockheed's Samos reconnaissance satellite, the Polaris 2,500-mile-range missile, and construction of some Army Reserve training facilities. This still leaves about \$500 million of appropriated money tied up by the Administration. Included in the unspent money are funds for B-70 development.

Washington

Newsletter

(Continued)

Disposal of vaccines nearing expiration date via a foreign aid program was suggested by Sen. Estes Kefauver (D., Tenn.) during last week's antibiotics hearings. Eli Lilly & Co. President Eugene Beesley agreed this would be a good idea. He disclosed that the company has dumped 14.5 million shots of Salk vaccine over the past five years because they became outdated.

Officials of the International Cooperation Administration are interested in the idea but reluctant to take the initiative. They say they don't supply drugs unless specifically requested by a foreign country. One official recalls that several years ago surplus Salk shots were obtained from Eli Lilly at nominal cost and sent to Jordan, Lebanon and Italy at the request of those countries. He also recalls that he approached other drug firms in hopes of obtaining some almost-free vaccine that they might have thrown away, but got a negative response.

Proposal to require compulsory licensing of drugs is gaining serious attention from Senator Kefauver. He may include it in an omnibus drug bill he expects to introduce early in the next session of Congress. Some other countries require a patent holder to license all other applicants at a reasonable cost, and Kefauver views this as a good approach to breaking up patent monopolies and getting prices down.

He gets support for the idea this week from the Public Affairs Institute, a nonprofit research organization. As a result of disclosures by the Kefauver committee, the institute recommends compulsory licensing, plus such measures as: (1) requiring government purchases of drugs to be by generic names, (2) requiring stricter control of labeling and of production by the Food & Drug Administration, (3) persuading doctors to prescribe by generic names, (4) assuring government control of patents growing out of tax-supported research.

Top Administration economists dispute recession forecasts for '61. These experts tell Vice-President Nixon that current signs of business softness do not indicate a recession is imminent. These are the men the Vice-President is listening to in planning his campaign.

They believe that what has kept business activity below the "soaring '60s" level is the new small-inventory policy of business. Treasury Secretary Anderson says inventories and investment plans are down because business planners no longer fear inflation, and so are not trying to jump into expansion before prices rise. He considers this a healthy attitude, one that will produce broad growth without inflation.

All these prognostications are made in defiance of slipping corporate profit forecasts. In January the Administration predicted \$50 billion in profits; now this is revised down to about \$47 billion, the '59 level.

September 24

Coal Tar Naphthalene Is Purified Economically by Continuous Sodium Process

A semi-continuous, commercial process for desulfurizing coal tar naphthalene, through treatment with metallic sodium, has been developed by U.S.I. specialists in sodium chemistry. This development provides coke oven producers with an efficient and economical method for purifying naphthalene to the levels demanded by makers of phthalic anhydride, dyes, vinyl plastics, moth balls and other naphthalene

78° Naphthalene can be treated with 1.5% by weight of sodium for reduction of sulfur content from about 0.5% to less than 0.05%, at a cost of under one half a cent per pound. Naphthalene recovery would exceed 99%. Capital investment for a plant to treat 50-60 million lb./yr. of naphthalene would be about \$50,000.

In such a semi-continuous plant naphthalene - with residual phenols removed through pretreatment with solid caustic for best sodium efficiency-is fed into a series of kettles and contacted with sodium for 30-60 minutes. The naphthalene is then flash distilled from the residue. The residue, upon decomposition with steam, yields crude napthalene, low in sulfur, which would be returned to the head of the process

Bulk sodium is metered directly into the treating kettles. With adequate agitation, sodium MORE will emulsify quickly and

New Trona Mining Method Planned in Intermountain's **Soda Ash Plant Expansion**

Intermountain Chemical Co., a 10% owned affiliate of U.S.I., has announced plans for a \$4,000,000 expansion of their soda ash facilities, to be completed in 1962. Capacity is being increased from 520,000 to 720,000 tons per year.

The company mines trona ore in the Green River area of southwestern Wyoming and refines the ore into soda ash. A new method for mining trona, developed by Intermountain, will be tried for the first time as part of the expansion. It is a continuous system for mining, extraction and movement of trona which eliminates blasting and drilling underground. The method uses augers, adapted from hardcoal mining.

During expansion, Intermountain will also make changes in refinery technology.

Final Regulations on Tax-Free And SD Alcohols Now in Effect

A&TTD Issues New Simplified & Liberalized "User" Regulations

The Alcohol and Tobacco Tax Division of Internal Revenue published final revised regulations (effective July 1) on the distribution and use of Specially Denatured and Tax-Free Alcohols in the Federal Register of June 29. These

New Polyethylene Bag with **No-Leak Closure Shows** Promise as Sterile Pack

A new, low-cost, sterile polyethylene bag with a wire tape closure is now being used by the dairy industry for milk sampling and reportedly finding application in a number of fields, including cosmetics. The containers are made of clear, heavy polyethylene tubing, sealed both top and bottom to keep the inside sterile.

A line of perforations is provided for removing the sealed top. Below the perforations are two wire tapes which help in opening and form the closure for the bag. For resealing, tapes are pulled taut, top of bag is rolled down, and projecting ends of tapes are bent over. A liquid-tight closure is formed. The three photos below show unsealing, opening and resealing.



New polyethylene bag is sterile-sealed until perforated top is zipped off.

Changes Act of 1958. For the first time, the A&TTD has separated "user" regulations from others covering production of ethyl alcohol and specially denatured formulations. Here is a brief summary of some of the important provisions of the new "user" regulations. For details, see Industry Circulars 60-22 on SDA and 60-21 on Tax-Free.

regulations provide for administration of

the Internal Revenue Code of 1954 as

amended by the Excise Tax Technical

(1) Industrial Use Permits-Forms 1481 (SDA) and 1447 (Tax-Free)-no longer have to be renewed annually. They remain in effect unless suspended, revoked, surrendered or otherwise terminated.

(2) Withdrawal Permits:

Form 1485 (SDA)-permits expire Oct. 31 each year. Renewal application must be filed annually by July 10, Effective Nov. 1, 1961, permits will allow monthly withdrawal of 1/6 of annual allowance (formerly 1/12). Form 1450 (Tax-Free) - permits expire Apr. 30 each year. Renewal application must be filed annually by Jan. 10. Effective May 1, 1961 (earlier with special permission), permits will allow monthly withdrawal of 1/6 of annual allowance (formerly 1/12).

(3) Losses-on SDA, the minimum quantity on which a claim for re-

MORE



Bag is snapped open by pressing in on wire tapes around top opening.



Liquid-tight resealing is done by rolling bag top down, and folding tape ends over.

U.S.I. CHEMICAL NEWS

1960

CONTINUED

Alcohols

mission of tax must be filed has been increased to 5 wine gallons. On Tax-Free, the minimum quantity has been increased to 5 proof gallons.

(4) Reports:

Form 1482 (SDA)-submitted annually instead of monthly for users who withdraw less than 660 gal./yr. Those who withdraw more must still report monthly, unless otherwise authorized.

Form 1451 (Tax-Free) -submitted annually instead of monthly.

- (5) Samples-SDA samples of one quart may be obtained without permit.
- (6) Samples of Labels and Advertising for articles not containing SDA, but made from SDA, no longer required by A&TTD except on request.
- (7) Carrier Permits-no longer required.
- (8) Proprietary Solvents-may be packaged by distributors and users as well as manufacturers, provided the packages are properly marked.
- (9) Return-Consent of Surety for return will no longer be required of SDA permittees, but will be required in blanket form from person to whom returned.

Many other points are also covered in detail in Industry Circulars 60-22 and 60-21. It can be seen that the A&TTD has made the new regulations more liberal, and has simplified the paper work involved in the use of SDA and Tax-Free Alcohols.

CONTINUED

Naphthalene

react. It is not necessary to use predispersed sodium, since crude naphthalene contains many naturally occurring trace impurities which are excellent dispersing aids for sodium.

For further information, send for the new U.S.I. technical data bulletin "Desulfurization of Naphthalene by Sodium". Address Technical Literature Dept., U.S.I. Chemical News, 99 Park Ave., N.Y. 16, N.Y.

New Polyethylene Resins Produce Squeeze Bottles Of Excellent Appearance

U.S.I. has developed three new PETRO-THENE® polyethylene resins with properties particularly suited to the blow molding of bottles for drugs, cosmetics and chemical specialties. Two of the resins can also be used for injection molding. All have been successfully field tested. Each of the resins produces bottles of outstanding appearance, good stress crack resistance and excellent low temperature flexibility.

PETROTHENE 101 and PETROTHENE 102-2 can be used in both blow molding and injection molding. The first has high stiffness, which permits reduction in wall thickness and, consequently, lower cost per container. The second has high impermeability to liquids, oils and gases, and a high flow rate which is particularly useful in blow molding pieces 6 to 20 oz. or heavier. PETROTHENE 209-2 is designed for use only in blow molding, especially for relatively small moldings-under 10 oz. -with thick side walls.

Data sheets on these three new resins are available from U.S.I. Address Technical Literature Dept., U.S.I. Chemical News, 99 Park Ave., New York 16, N. Y.



First heat exchanger successfully fabricated from zirconium is part of unit to concentrate H2O2 solutions. Zirconium's corrosion resistance in this application made it profitable to overcome welding problems associated with the metal. (Photo courtesy The Pfaudler Co.)

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

High molecular weight synthetic polypeptides now commercially available include glutamic acid, 7-benzyl glutamate, lysine hydrobromide, ɛ-carbobenzoxylysine, e-carbobenzoxylyrosine, leucine, alanine, phenylalamine, tyrocine.

No. 1630

New booklet on industrial hazards—casualty, fire, pollution and product liability—discusses measurement, detection, correction and litigation. Stresses prevention, and need for help of experts when mishaps occur.

No. 1631

Borax and other boron compounds are described in new brochure which can now be obtained. Contents include historical data; production, uses, properties of commercial boron compounds; properties of 28 research chemicals.

10. 1632

Eit for emergency radioactivity decontamination is now on market. Provides radioisotope users and laboratories with respirator, disposable clothing, decontamination solutions, instruction manual—all in steel case. No. 1633

Acetone specifications, properties, shipping methods and uses are listed in new data sheet now available. Material is widely used as solvent, and in making drugs, dyes, plastics and many other organics.

No. 1634

New polyethylene drum faucet in said to empty 55-gallon drum of average material in about two minutes. Firs standard 2-inch drum outlet. Comes with polyethylene spout closure to eliminate resident standard to the standard standa

Hair care is covered in new book now being sold. Said to be most complete ever written for layman on growth, care, diseases and treatment of hair disorders. No. 1836

Non-electric magnets have been installed under belts of conveyors on aerosol filling lines to hold cans in place during underwater travel to heating both. Magnetic units said to be available in lengths to fit any conveyor belt.

The rare earths plus thorium, scandium and yttrium—chemicals, metals, alloys—are detailed in new booklet. Gives uses, potentials, production, properties, chemical analyses for over 50 products.

No. 1638

New, versatile, bench model superspeed centri-inge with built-in safety shield, accommodating 5 interchangeable rotors for batch or continuous flow separations, is on market. Rotors are fitted with removable polyethylene liners. No. 1639

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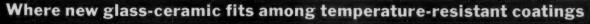
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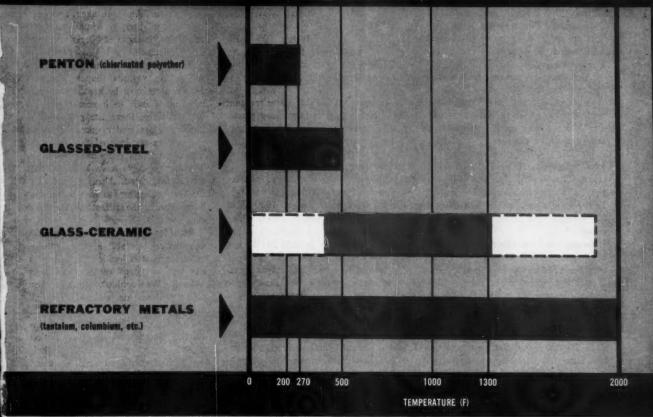
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New Shield for High-Temperature Corrosion

This week The Pfaudler Co., a division of Pfaudler Permutit Inc. (Rochester, N. Y.), unveiled a new glass-ceramic coating for metals. Its combination of high structural strength, impact and corrosion resistance suggests intriguing possibilities for nuclear and space applications. The coating-metal composite shows promise of becoming a workhorse material for high-temperature, corrosive chemical processing.

The chart above shows how the new glass-ceramic fits into the high-temperature processing range, compares with other materials used by Pfaudler in process equipment lining and construction. The exact upper and lower temperature limits for the material haven't been fully defined as yet—for, although ready to go

commercial, Pfaudler still must complete considerable development work.

Development problems stem from the complex nature of the coating and the large number of coatingmetal combinations possible. Pfaudler has actually applied for patents on the coating-metal combination, which it calls Nucerite, rather than for patents on the coating itself.

"It's the end-product—the finished equipment or part which is a combination of metal and ceramic components—that we are interested in," says Cloyd Betzer, technical manager, of the Pfaudler Division.

So far, Pfaudler has worked with about 50 formulations, expects to shake them down to 10 or 12. "We'd like to come up with one or two formulations, but that doesn't seem

probable," says Betzer. The formulation problem is not Pfaudler's alone. Competitor A. O. Smith, which has not yet come up with a commercial crystalline glass, is now starting a computer program to arrive at formulations (CW, Sept. 3, p. 73).

Ceramic Formulations: The coating material is crystalline glass (glass is normally amorphous) in the same family as Corning Glass Works' Pyroceram (CW, June 8, '57, p. 64). In fact, Rushmore Mariner, general manager of Corning's New Products Division, has this to say about Pfaudler's development:

"This new polycrystalline glass or ceramic component of the composite is similar in general classification to Corning's glass-ceramics introduced in '57 under its trademark Pyroceram, but exhibits its own unique proper-

As with Corning's glass-ceramics, Pfaudler's material is actually a group of materials. Physical properties depend to a large extent on the size of the crystals in a particular formulation. For example, large crystals are weak, have no thermal-shock resistance. Other crystals have poor chemical resistance.

And the glass-ceramic formulation depends on the base metal to which it is chemically bonded. Pfaudler has worked mostly with Inconel, then with the 300 stainless steels, carbon steel and reactive metals (e.g., tantalum, columbium) in that order. One reason why carbon steel hasn't been high on the base-metal list: the glass-ceramic's ability to resist corrosion at high temperatures makes it a natural for coating the more heat-resistant metals.

Impressive Properties: Although the coating material is a crystalline glass, or glass-ceramic, Pfaudler is reluctant to call it anything other than a "ceramic component" of its "family of ceramic-metal composites." And the company resists making comparisons of the new coating and its glassed-steel. Its reasoning: the new ceramic has such impressive properties that it is in a class by itself. Any comparison with glassed-steel would be unfair.

For example, in one formulation now being field tested, the new material is resisting corrosive vapors at 1300 F. Pfaudler won't identify the service in any more detail except to say that the conditions would destroy most metals in a few minutes and that the best metals tried have lasted only from "a few weeks to a couple of months." It has also withstood hydrogen chloride gas at 1200 F. It is expected that these temperatures can be exceeded by several hundred degrees.

When struck a shattering blow, Nucerite will fracture but not to the extent glassed-steel does. It also doesn't have the tendency to spall and enlarge the rupture as does glassed steel. But it can be repaired by using the same metal-plug technique that is used for glassed-steel.

The company gives without reluctance these comparisons with other materials:

Tensile strength: The ceramic com-

ponent withstands more stress vs. mild steel—without permanent deformation.

Impact strength: The ceramic component withstands 10.8 ft. lbs. of pointimpact force—about 18 times the force that would shatter safety plate glass.

Thermal shock: It has 300-400% greater resistance to damage vs. existing glassed-metals — temperature differential of 1200 F can be withstood.

Abrasion: It's 400% more resistant to abrasion than is laboratory glass.

Heat transfer: It has 6 to 10 times better transference than do other ceramics (unidentified) used in high-temperature corrosive service.

High-temperature stability: The ceramic component will protect molybdenum from oxidation at 1600 F in an oxy-acetylene flame.

In aqueous environments, its resistance to corrosion is said to be superior to most metals'. But most of the testing has been at temperatures at which gaseous, rather than completely aqueous, environments would exist. Reportedly, the new material hasn't shown aqueous corrosion resistance that has been superior to that of glassed-steel—although some of the formulations show promise.

Not a Replacement: The test results so far have prompted E. A. Sanford, Pfaudler vice-president and director of research, to comment: "We do not expect . . . that Nucerite will replace any of our current corrosion-resistant materials; but rather, will expand the scope of applications for which we can furnish the proper material of construction."

In addition to fabricating glassedsteel equipment, Pfaudler has been one of the most active pioneers in fabricating process equipment from titanium (CW, April 13, '57, p. 27), zirconium and other reactive metals. Earlier this year Penton (chlorinated polyether) coating of equipment by a Pfaudler-developed water suspension technique was added to its processing line.

Penton-lined equipment is lower in price than is glassed-steel, but can't match its performance. And, although Pfaudler hasn't developed a price schedule for Nucerite as yet, it will be higher than the price of conventional glassed-steel and lower than that of reactive metals in most cases.

Part of the cost problem for Nucerite: it must go through special heat treatment to convert the amorphous-glass formulation into crystalline structure. Control of the process is tricky, particularly for large-scale production. And mistakes are difficult to salvage by usual sandblast techniques because of Nucerite's abrasion resistance.

There are also some problems in fabricating various shapes. For example, glass must be kept under compression if it is to have strength. In vessel linings, there are problems of keeping glass under compression at the convex portions of the openings. These problems pertain to Nucerite. Tubular products have been the first shapes fabricated. Also, return bends in heat-exchanger tubing have now been fabricated satisfactorily, as have small vessels.

Pfaudler cautions that because the new material is still in the development stage, it is looking for inquiries for test purposes rather than firm orders. "We couldn't promise any delivery dates on orders anyway," says Betzer.

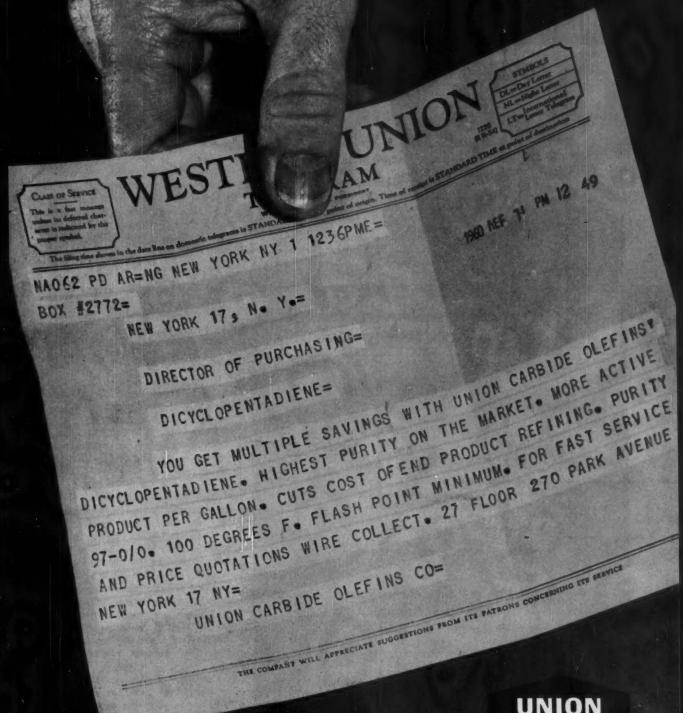
The company prefers to sift inquiries, recommend the construction material based on all factors, including performance and cost. In cases where Nucerite appears to have an advantage, tests with dumbbells and plates to determine the best ceramic formulation and backing metal may be required.

Although there are many questions that remain open, Pfaudler's new glass-ceramic shows definite promise as a construction material. And within the next few years, the chemical industry is certain to put it to test.

Pressure Vessel Data

Aiming to ease problems in pressure vessel design (CW, May 7, p. 59), The American Society of Mechanical Engineers (29 West 39th St., New York 18) is offering a new book of collected papers on pressure-vessel and piping design. The papers have appeared in technical publications from 1927 through '59.

The book is aimed at answering the long-standing request of designers for background material that has been too voluminous to include in the ASME Boiler and Pressure Vessel Code.



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2 Straddle the clip with the applicator...and...hook rim grip under rim of can.



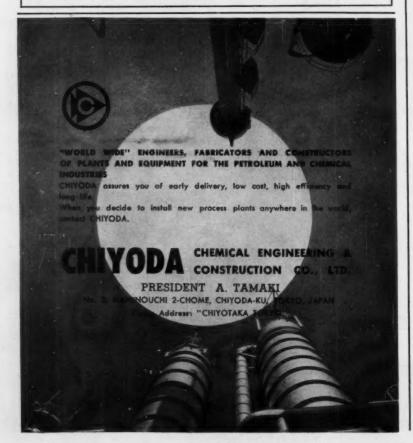
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EQUIPMENT

Pipeline Aid: A new device for keeping separate "slugs" of petroleum products in a pipeline is in service this week. It was developed by Gulf Oil Research Center. It's about 4 ft. long, has a water-filled sphere in the nose and two concentric rubber tail cups. These cups ensure separation and give a tight fit so that the steel unit can be pushed through the pipeline as the liquids are pumped along. The device will travel at about 11/2 m.p.h. Current practice-to use no separating unit-requires operators to remove and recycle the interface liquid—up to 3,000 bbls., depending on line length and products. Initial tests have been made through a 107mile pipeline between Booth Terminal (Philadelphia) and Mechanicsburg. Pa.

Air Tubing: The DeVilbiss Co. (Toledo, O.) has added flexible vinyl tubing to its hose line. The tubing is suggested for use with pneumatic tools, spray-painting equipment and oilcontaminated air systems. Size: 1/4-in. I.D., 1/2-in. O.D.; working pressure: 150 psi.

Porous Nylon Parts: Porous nylon parts that absorb 15-50% by weight of oil are a new product line of The Polymer Corp. (2120 Fairmount Ave., Reading, Pa.). The parts, which can be used as bearings, seldom need refills of oil.

High-Vacuum Valve: Kane Engineering Laboratories (460 Cambridge St., Palo Alto, Calif.) is offering a new all-metal valve for all-metal, high-vacuum systems where organic material can't be tolerated. The valve uses inert-gas-welded, 300 series stainless steel as the seating material and a special valve seating arrangement to bypass the problem of removing trapped residual gases that are normally found in organic seating materials. Sizes available: 1, 4 and 6 in.

Centrifugal Pump: Eco Engineering Co. (1 New York Ave., Newark, N.J.) is now supplying its small, allpurpose centrifugal pumps in Hastellov B and C for corrosive services where previously offered Carpenter 20 steel can't be used. Hydraulic capacities (including heads to 57 ft., ca-



Technical Eicosane is a water white mixture of predominantly straight chain paraffin hydrocarbons averaging 20 carbon atoms per molecule. Typical properties are: Melting Point, 96.5° F; Color (Saybolt), 25; Specific Gravity, 0.75° @ 176° F; Boiling Range @ 10 mm., 10%—383° F, 90%—410° F. It can be readily chlorinated to yield a product with outstanding stability characteristics. In addition to being more stable, chlorinated eicosane has a lower viscosity for a given percentage of chlorine than paraffin wax as shown on the chart at left.

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Because Technical Elcosane chlorinates so readily, it is used to make excellent flameproofing compounds for fabrics and for extending the life, mileage and effectiveness of heavy-duty gear lubricants. It is also used as an excellent raw material in manufacturing chemical plasticizers to help plastics resist freeze-up and the effects of hot sun, salt water and oil, and as a textile lubricant and cosmetic base.

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PRODUCTION

pacities to 35 gpm.) are comparable to those of the Carpenter 20 models.

Precipitator Converters: A unit for converting the rectifiers of electrostatic precipitators from mechanical to silicon type is a new offering of the Buell Engineering Co. (123 William St., New York). The conversion unit costs about one-third that of a complete new power pack, according to Buell. It uses all existing equipment except the rectifier motor, disc, shoes, suppressor elements and pedestal, ties in with existing ac. connections and dc. switchgear. Changeover requires six to eight man-hours.

Centrifugal Blower: Bayley Blower Co. (1817 South 66th St., Milwaukee 14) has redesigned its centrifugalblower line for higher pressures and velocities, greater volumes and quieter operation. Key to the redesign is a new fan wheel with deepened inlet cone and backward-curved, spun wheel shrouds. There are also finer tolerances between stationary and moving parts. The fans can be used at temperatures up to 850 F, will move 344 to over 700,000 cfm. of air with 1/4- to 6-in. static pressure.

Plastic Tanks: Vertical and horizontal glass-reinforced polyester tanks are a new part of Justin Enterprises, Inc.'s (7000 Montgomery Pike, Cincinnati 36) line of storage equipment. The tanks, with capacities from 20 to 20,000 gal., are made of Atlac 382, Atlas Powder's bisphenol-A based plastic. They are translucent, enabling observation of the liquid level.

Valve Adapter: Febco, Inc. (1993 Blake Ave., Los Angeles 39) offers two new adapters for converting manually operated valves to automatic service. Adapter is installed by screwing into place after removal of the valve's stem and bonnet. Model 28E is for electric operation; Model 28H for hydraulic.

Dispension Mill: Kinetic Dispersion Corp.'s (95 Botsford Pl., Buffalo 16, N.Y.) new T-20 top-driven dispersion mill has a built-in heat exchanger for cooling of batches made in nonjacketed tanks. The mill can be driven with a 25-hp., two-speed, or a 30-hp., single-speed motor. All working parts, including heat exchanger, are of stain-



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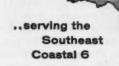
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PRODUCTION

less steel. Unit is for tanks with capacities up to 100 gal.

Analog Computer Kit: Edmund Scientific Co. (Barrington, N.J.) is offering its new analog computer kit as a training device for industrial personnel. The kit, which can be assembled with screwdriver and pliers, operates on two flashlight batteries, can be used to demonstrate basic analog computing principles. Price: \$14.95.

Ball Valve: Cameron Iron Works, Inc. (Houston, Tex.) says its new ball valve, which uses the principle of rotating seats, requires no lubrication for bubble-tight sealing, is compact, weighs only a fraction as much as others in its class. With each operation of the valve, the seat rotates, changing the relation of the mating surfaces to gain continuous reseating. The valve may be installed in any position, can be used with all types of electric, pneumatic and hydraulic operators on the market. Sizes: 2 to 36 in. for 150- to 600-psi. ASA classes, 2 to 6 in. for 1,000- to 5,000-psi. API working pressure rating.

Air Compressors: Clark Bros. Co. (Olean, N.Y.) is out with a new line of 100-psi. air compressors in the 25- to 100-hp. range. The two-stage units are air cooled to eliminate the need for cooling water and jacketing, reduce weight.

Enclosed Electrical Equipment: Westinghouse Electric Corp. (P. O. Box 2099, Pittsburgh 30) has a new series of totally enclosed dc. motors and generators that include two departures from conventional design. High-temperature silicone insulation is used for machines rated and built for continuous operation with a temperature rise of only 75 C. A highcapacity system of controlled ventilation is used with blowers and heat exchangers mounted at the shaft end. Advantages: faster response, stability, increase in insulation life.

Toxicity Indicator: Johnson-Williams, Inc.'s (Palo Alto, Calif.), new Model SS combustible gas detector will indicate the presence of minute quantities of gases such as toluene and xylene. It's scale is set for the 0-1,000-ppm. range, will give accurate readings as low as 10 ppm.

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Ethylamines

Propylamines

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PRODUCT

AMINES-COMMERCIALLY AVAILABLE*

MONOMETHYLAMINE (anhydrous)a CH3NH2 $(CH_3)_2NH$ DIMETHYLAMINE (anhydrous)b TRIMETHYLAMINE (anhydrous)c (CH₃)₃N MONOETHYLAMINE (anhydrous) CH₃CH₂NH₂ MONOETHYLAMINE (70%) CH3CH2NH2 DIETHYLAMINE (CH₃CH₂)₂NH TRIETHYLAMINE $(CH_3CH_2)_3N$ MONO-n-PROPYLAMINE CH3CH2CH2NH2 DI-n-PROPYLAMINE (CH₃CH₂CH₂)₂NH TRI-n-PROPYLAMINE (CH₃CH₂CH₂)₃N MONOISOPROPYLAMINE (anhydrous)d (CH₃)₂CHNH₂ DIISOPROPYLAMINE $[(CH_3)_2CH]_2NH$ MONO-n-BUTYLAMINE CH3CH2CH2CH2NH2

DI-n-BUTYLAMINE $(CH_3CH_2CH_2CH_2)_2NH$ TRI-n-BUTYLAMINE (CH₃CH₂CH₂CH₂)₃N MONOISOBUTYLAMINE (CH₃)₂CHCH₂NH₂

MONOAMYLAMINE C5H11NH2 DIAMYLAMINE $(C_5H_{11})_2NH$ TRIAMYLAMINE $(C_5H_{11})_3N$

AMINES-SEMI-COMMERCIAL (In Pilot Plant Quantities)*

SEC-BUTYLAMINE CH₃CH₂CH(NH₂)CH₃ 1,3-DIMETHYLBUTYLAMINE (CH₃)₂CH₂CH₂CH(CH₃)NH₂ BIS(1,3-DIMETHYLBUTYL)AMINE $[(CH_3)_2CH_2CH_2CH(CH_3)]_2NH$ DIISOBUTYLAMINE [(CH₃)₂CHCH₂]₂NH

ALKYL ALKANOL AMINES-COMMERCIALLY AVAILABLE*

DIMETHYLAMINOETHANOL (CH₃)₂NC₂H₄OH C2H5NHC2H4OH **ETHYLAMINOETHANOL** DIETHYLAMINOETHANOL (C2H5)2NC2H4OH $C_2H_5NHC_2H_4OH/C_2H_5N(C_2H_4OH)_2$ ETHYLAMINOETHANOLS (mixed) approx. 50/50 by weight

DIISOPROPYLAMINOETHANOL [(CH₃)₂CH]₂NC₂H₄OH $(CH_3)_2CHNHC_2H_4OH/[(CH_3)_2CH]_2N(C_2H_4OH)_2$ ISOPROPYLAMINOETHANOLS (mixed) approx. 60/40 by weight DIBUTYLAMINOETHANOL (C4H9)2NC2H4OH

ALKYL ALKANOL AMINES—SEMI-COMMERCIAL (In Pilot Plant Quantities)*

1-DIMETHYLAMINO-2-PROPANOL **ETHYLDIETHANOLAMINE** BUTYLAMINOETHANOL BUTYLDIETHANOLAMINE 1-CYCLOHEXYLAMINO-2-PROPANOL

(CH₃)₂NCH₂CHOHCH₃ $C_2H_5N(C_2H_4OH)_2$ C4H9NHC2H4OH C4H9N(C2H4OH)2 CH2(CH2)4CHNHCH2CHOHCH3

(a) also available as 40% aqueous solution
(b) also available as 25% and 40% aqueous solutions
(c) also available as 25% aqueous solution
(d) also available as 50% aqueous solution

PROPERTIES		SHIPPING INFORMATION			
MOLECULAR WEIGHT (CALC'D)	SP. GR. @ 20/20°C.	DISTILLATION, °C.@ 760 mm Hg.	AVG. WT. PER GAL., LB.	FLASH POINT, °F. (open cup)	FORM AS SHIPPED
31.06 45.08 59.11	0.67 0.66 0.64	-6.3(b.p.) 6.9(b.p.) 2.9(b.p.)	5.6 5.5 5.3	0 0 0	Liq. Comp. Gas
45.08 45.08(anhyd.) 73.14 101.19	0.70-0.71 0.79-0.81 0.70-0.71 0.73	16.6(b.p.) 36(b.p.) 53.5-59.5 85.0-91.0	5.9 6.6 5.9 6.1	0 0 0 20	" " " Liquid "
59.11 101.19 143.27 59.11 101.19	0.71-0.72 0.74 0.76 0.68-0.70 0.715-0.720	45.0-52.0 105.0-112.0 150.0-158.0 30.5-34.5 (95%) 84(b.p.)	6.0 6.2 6.3 5.8 5.9	-35 45 105 -35 30	66 66 66
73.14 129.24 185.34 73.14	0.74 0.76 0.77-0.78 0.72-0.74	74.5-81.0 153.0-165.0 199-216 (95%) 64.0-75.0	6.2 6.3 6.5 6.3	10 135 175 20	66 66 66
87.16 157.29 227.22	0.75 0.77 0.78-0.79	87.0-110.0 185.0-205.0 235.0-265.0	6.3 6.4 6.6	40 150 190	66 66
73.14 102.20 187.36 129.24	0.72-0.73 0.747-0.753 0.772-0.778 0.74	61.0-70.0 105.0-111.0 179.0-205.0 131.0-143.0	6.0 6.2 6.5 6.2	20 55 160 85	Liquid " " "
89.14 89.14 117.19 109.0-119.0 (combining wt.)	0.885-0.890 0.91-0.92 0.88-0.89 0.95-0.99	130.0-137.0 160-170 157.5-164.0 100-265	7.4 7.5 7.4 8.1	105 160 135 90	Liquid " "
145.24 114.5-117.5 (combining wt.) 173.29	0.873 0.91-0.94 0.852-0.868	188.0-192.0 110-265 222.0-234.0	7.3 7.8 7.2	150 155 200	66
103.16 133.19 117.19 161.24 157.25	0.845-0.855 1.01-1.02 0.88-0.99 0.96-0.97	121.0-127.0 (95%) 246.0-260.0 192.0-210.0 268.0-286.0 freezing point 43°C.	7.1 8.5 7.4 8.1	95 255 170 260	Liquid " " Solid

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Pennsalt's complete service on amines

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If your program includes products that contain organic nitrogen with alkyl groups, alkoxy groups, or combinations of these, you may be able to use amines

profitably. Applying over a quarter-century of experience with these versatile chemicals, Pennsalt can give you expert recommendations on possible reactions and perhaps assist you in determining the most economical synthesis route to your end product. When you design pilot equipment, you will profit from the complete physical and chemical data available from Pennsalt.

in selecting amines for economy

Pennsalt manufactures a broad line of C₁ to C₅ alkyl and alkyl alkanol amines . . . methyls, ethyls, propyls, butyls, amyls and a number of ethylene oxide derivatives. You can count on unbiased help in determining which is the *one* amine most economical for your application.



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in handling and storing

Pennsalt's Technical Service Engineers will recommend safe, practical handling and storage methods, help design bulk storage facilities and process equipment, advise you on materials of construction, piping, pumps, valves and other equipment for amine service.



Pennsalt manufactures dithiocarbamates and other amine derivatives and can often supply special amino compounds to meet specific process requirements. To get the benefits of these Pennsalt services see your Pennsalt representative or write Industrial Chemicals Division, PENNSALT CHEMICALS CORPORATION, Three Penn Center, Philadelphia 2, Pa.

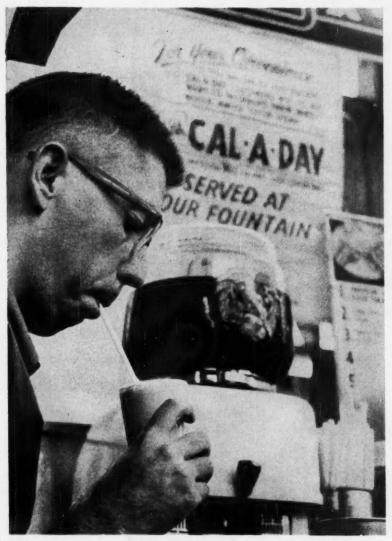
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Soda fountains are one outlet for fast-selling diet powders.

Fat Profits in Slimming

U.S. dieters will this week be able to buy a liquid version of the powdered food concentrate Metrecal, Mead Johnson & Co.'s (Evansville, Ind.) successful entry in the \$750-million reducing aid market.

Liquid Metrecal will be packaged in 8-fl.oz. metal cans containing one glassful — 225 calories — of plain, chocolate or butterscotch beverage. Price: 40¢/can or \$2.39/six-pack. Mead Johnson's variation on its fast-selling, money-making Metrecal powder is an attempt by the ethical-phar-

maceutical house to counter the dozens of imitations of Metrecal that have flooded the market.

So far similar products have been formulated by small companies that manufacture for private-label dealers. But now major producer Sterling Drug Inc.'s Glenbrook Labs Division (New York) is testing its Calorid and plans to make a nationwide promotional effort—on a scale comparable to Mead Johnson's—in a few months.

And Revlon Inc.'s (New York)

pharmaceutical division, Thayer Laboratories, is reported to be working on a Metrecal-type reducer, which is expected to be on the market in the near future.

Also, The Wander Co. (Chicago), maker of Ovaltine, will be promoting its recently introduced Minvitine, which is being retailed in food stores as well as drug stores.

Widespread public acceptance of the products has built an estimated \$50-million market in less than a year.

M.D.s Get First Chance: Metrecal was initially offered to the medical profession in Oct. '59, shortly afterward went on public sale.

The first ads for Metrecal appeared in the Journal of the American Medical Assn. But it was not a Journal endorsement of the product. An AMA spokesman told CHEMICAL WEEK that, while Metrecal is a carefully formulated and nutritious product, AMA has not endorsed it and expresses doubts about whether it should be sold directly to the public. The association feels that formula diets should be used under a physician's care.

Metrecal is a powdered mixture of skim and whole milk, soya flour, sugar, starch, corn oil, coconut oil, yeast, and flavoring, plus vitamins and minerals. It is not an appetite suppressant, but a food substitute. Each half-pound can, one day's supply (900 calories), provides 70 grams of protein, 20 grams of fat, and 110 grams of carbohydrates.

Metrecal is the result of a Mead Johnson idea in reverse. In '53 the company developed Sustagen, a concentrated, powdered therapeutic food for hospital patients who needed to gain weight. The product was mixed with water. Mead Johnson, encouraged by Sustagen's success, set out to make a similar powdered concentrate for people wanting to lose weight.

When first introduced, Metrecal was marketed only in a bland vanilla flavor. Later, chocolate and butter-scotch were added to the plain flavor, which can be enhanced by addition of coffee, fruit flavors, etc. Mead Johnson says they plan to make no other flavors.

Metrecal has been a winner for

Mead Johnson, whose total net sales in '59 amounted to \$60 million. Metrecal sales have hiked that figure by \$20-25 million/year.

Others Had Idea: The idea of replacing a natural food diet with a nutritious fluid diet is not new. Milk diets, for instance, have been in use for years. About five years ago Life Research Corp. (Chicago) began door-to-door selling of a powdered product called Wey-Rite, similar to Metrecal. Wey-Rite received little publicity, however.

Several dozen companies are supplying a 900-calorie food concentrate similar to Metrecal. Most have imitated Metrecal, instructions for use, flavor, and often packaging (glass jars are also used). Main difference is price: Mead Johnson this month reduced Metrecal's price from \$1.59 for 8 oz. to \$1.29, but it's still considerably higher than prices of its imitators, which range from 45¢ to about \$1.09.

Among Metrecal's competitors are Dietene Co. (Minneapolis), with Dietene and Meritene; Clay Franklin Inc. (Tuckahoe, N. Y.), Caltrol; Dietary Controls Co. (Englewood, N. J.), Regucal; Leonet Corp. (New York), Reducal; and Signet Co. (Chicago), Procal.

Many department, discount, drug, food and mail-order stores all over the country are cashing in on the trend by merchandising their own brands of the concentrate. Macy's sells Macy's 900 Calorie Food Concentrate, Master's markets its Master-Cal, and Sears, Roebuck & Co. is selling Bal-Cal, said to be made by The Jewel Tea Co.

Whelan Drug Co., in addition to offering Cal-A-Day in 8-oz. jars, whips glassfuls of the beverage at its soda fountains for 35¢ each.

And Slenderella supplies a glass of Countdown free as part of its weightreducing courses.

Is It a Fad? In some quarters it is thought that the boom in sales will fizzle out in '61 to about half of this year's \$50-million retail sales. But even if this happens, the remaining market will still be a sizable one. Barring cut-throat marketing—profit margins still look hefty, despite today's crowded product area—these slimming products should help fatten sales for their companies for at least another year.

Exterior Coating

Four houses in the Louisville, Ky., area will be sprayed this week with a textured urethane coating soon to be introduced in the U.S. by BB Chemical, a division of United Shoe Machinery Co. (Cambridge, Mass.).

The coating, developed by BB's Swedish (Helsingborg) subsidiary, will be sold, starting January, through the company's franchised dealers.

The urethane—called Bostik Textured Coating—is applied in combination with sand. The spray equipment was designed by BB Chemical. Using a hose extension it's possible to paint as high as five stories, with compressor equipment on the ground level.

The coatings, which come in 13 colors, sell for \$10-14/gal.—only to franchised applicators. (BB says it has signed up five applicators so far, plans to have 20 by the first of the year and about 100 eventually.)

Cost of the application, including labor, is figured at 30-40¢/sq. ft. Precoating preparation, says BB, is

the same as that used with conventional coatings.

The company hasn't decided whether to lease the spray equipment or sell it outright.

Smoother Smoking

Cigar manufacturers and smokers are likely to benefit from three new plasticizers developed by American Machine & Foundry Co. (Springdale, Conn.).

The compounds are hydroxymethylphenols, aminomethylphenols, and polyesters produced from various glycols, triols, and dicarboxylic acids containing 6 to 10 carbon atoms in a straight chain. Intended for use in reconstituted tobacco sheeting, the plasticizers are said to decrease the formation of odorous combustion products, as well as increase moisture resistance.

Potential bonus: stretchier cigar wrappers. The agents are able to increase wet elongation of tobacco sheets.



The Chief Brushes Up on Sales Pitch

Dwight Joyce (above), The Glidden Co.'s chairman and president, turned paint demonstrator and salesman last week. He's shown putting his company's latex paint through its paces at The May Co. in Cleveland. It was

part of a day-long, nationwide selling effort by Joyce and other company officials. Joyce visited 15 retail stores in the Cleveland area. He bagged his first customer at 8:30 a.m., sold a gallon of Spred Satin.

on hand ... TRIPOLYPHOSPHATE preblended to insure extra-high analysis

A new process is used to make AA Quality Sodium Tripolyphosphate. It includes a special operation that preblends the reactants before calcining. You benefit from the extra detergent strength that is developed and carried through to the finished product.

You also benefit from a free-flowing uniformity. It comes from the careful control built into thoroughly modern spray drying and calcining units. Send for production samples of this new "Tripoly" now!

Top detergent quality in every granule...

AA QUALITY SODIUM TRIPOLYPHOSPHATE

AA QUALITY SODIUM TRIPOLYPHOSPHATE
AA QUALITY TETRASODIUM PYROPHOSPHATE
AA QUALITY TRISODIUM PHOSPHATE
AA QUALITY DISODIUM PHOSPHATE

Chemical Division

The American Agricultural Chemical Company

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Plant pathologists are probing novel means of combating plant diseases. Their findings could trigger the development of new commercial products.

Promising results include combination fungicide-growth stimulants, inoculants against virus attack, and seed treatment with newly developed fungicides.

Tobacco is taking role in research seeking new agents to control plant disease.

Plant Diseases Spur New-Product Research

Manufacturers of plant diseasecontrol chemicals may soon be turning out products to inoculate plants against virus, combination fungicide and growth stimulators, and enzymeinhibiting chemicals.

Research leading to such products was reported at the American Phytopathological Society (a professional organization of plant disease scientists) meeting at Green Lake, Wis.

Besides pointing the way to future research and development, the plant pathologists also reported on some new diseases that are becoming serious problems among economic crops.

A. F. Ross and Robert F. Bozarth, of Cornell University, reported that certain plants are able to stiffen their defenses against virus disease attacks once they have become infected. They also discovered that not only would a plant inoculated with a virus develop resistance to that one virus, but would also have increased resistance to inoculations with other disease-causing viruses.

In their experiments the Cornell researchers inoculated the leaf of a tobacco plant with virus that causes tobacco mosaic. Typical disease symptoms developed around the infected leaf area. However, when the same area was inoculated a week later, no signs of infection developed when other parts of the same leaf and other leaves were inoculated with the virus.

A fungicidal chemical may also speed plant growth, say G. R. Cooper,

A. S. Allen, M. T. Hilborn and R. C. McCrum, of the University of Maine. They found that captan, when used to control plant diseases on apples and strawberries, also produced higher yields. Using captan on duckweed, the researchers found that a 2.4 ppm. addition of the chemical to the nutrient growing solution increased dry weight plant yield better than 60%.

Enzymes are a major weapon used by fungi to penetrate into and cause disease symptoms in plants, according to Dawson C. Deese and Mark A. Stahmann, of the University of Wisconsin. Working with the fungi that cause fusarium and verticillium wilts (the major diseases of tomatoes, potatoes and other crops), they conclude that fungal-produced enzymes attack the pectin in vascular cell walls inside plants causing formation of pectin gels. These block the vessels which carry nutrients from plant roots to stem foliage and fruit.

The future may see use of fungicidal combinations to take the place of single-chemical seed treatment, as a result of tests run by L. D. Leach and W. J. Tolmsolff, of the University of Wisconsin, and R. H. Garber, of the USDA. They found that treating cotton and sugar beet seeds with a combination of fungicidal chemicals was highly effective in reducing damping off, a disease that can wipe out seedling stands of these crops. It's expected that several sugar beet companies will use a combination treat-

ment in large-scale tests next year.

Trouble on the Way: If makers of agricultural chemicals feel that none of the present scourges offer potential profits for research and development, they can always try their hands at some of the diseases that have just begun to emerge as problems. Some examples cited at Green Lake:

In the Rogue River valley of Oregon, for instance, a root rot not previously known to attack pear trees is apparently a major cause of the rapid decline now affecting many orchards. Oregon State College plant pathologist H. R. Cameron has identified the soil-borne fungus attacking the pears to be the same as that causing root rot of avocado.

A new apple disease threatalternaria rot-is now infecting as many as one-third of the apples in Missouri, Illinois and Indiana orchards. The disease, which infects only the Jonathan variety of apples at present, appears also to be a threat to Golden Delicious strains as well. William Tweedy and Dwight Powell, of the University of Illinois Dept. of Plant Pathology, report that the fungus, which causes fruit to develop two to three black spots 1/4 in. in diameter and 1/8 in. deep, is destructive only when able to attack beneath the skin of apples. They also report that the fungus is resistant to fungicides normally used to control orchard diseases.

A new virus disease of many leg-



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ume crops, including dry beans, green beans, lima beans, tepary beans, cowpeas and chickpeas, has been identified by two Washington State University plant pathologists, C. B. Skotland and D. W. Burke. The virus, unrelated to bean viruses 1 and 2, is spread from diseased to healthy plants by aphids, according to the researchers.

Floyd F. Henrix and Robert D. Raabe, of the University of California, have identified a new disease of gloxinias as sclerotinia blight caused by a soil-borne fungus. The blight, which first appears as soft lesions on flower tissue, causes stunted plant and bulbs of reduced size. The researchers say they achieved good control of the blight, using 40% pentachloronitrobenzene, applied as a soil drench.

Eggplant growers who have greater than normal eggplant losses due to wilt, a disease caused by a soil-borne fungus, may actually be fighting a combination of threats from a nematode-fungus team, according to C. D. McKeen and W. D. Mountain, of the Canadian Dept. of Agriculture. They suggest that enzymes secreted by nematodes into eggplant roots may provide chemical encouragement for the entrance of the wilt fungus.

In reporting promising results against the older threats as well as focusing attention on new threats, the researchers at Green Lake have disclosed a bumper crop of problems on which they can work for some time.

PRODUCTS

Oral Aerosol Attachment: A snapon metered oral attachment for aerosols has been developed by Emson Research (118 Burr Court, Bridgeport, Conn.). The unit fits on standard 20-mm. valves, is intended for use with medicinal throat spray, mouth wash, and breath freshener products.

Antistick Agent: Dixon Corp. (Bristol, R. I.) is marketing a reinforced antistick agent in aerosol units under the tradename Rulon Spray. The spray is intended as a lubricant for belts, gasket, gears, etc., sells for \$2.50 for a 6-oz. can.

Solid Ink Coder: Thomas Engineering Co. (9257 North Laramie Ave.,

Skokie, Ill.) has developed a series of coders and printers designed for attachment to packaging machines. The coders use a Porelon solid-ink roller (eliminating the need for fluid inks). The Teko series coders will print up to 250,000 impressions on porous or semiporous surfaces with a single Porelon roll.

Cationic Softener: Crest Chemical Corp. (225 Emmet St., Newark, N.J.) is marketing a stearic acid amine compound designed as a softener for synthetic fabrics. It's called Velvacrest L, is said to show no discoloration on pressing, curing or aging of goods to which it's applied.

Phenolic Varnish: A phenolic varnish that produce a flame-retardant, high-electrical-grade laminate with cold-punching properties has been developed by Monsanto Chemical Co.'s Plastics Division. It's called Resinox 495, is intended for printed circuits used for commercial radio and TV applications.

Polyester Coatings: A line of polyester coatings has been developed by The Goodyear Tire & Rubber Co.'s Chemical Division. The Vitel resin coatings are said to have exceptional resistance to abrasion, ultraviolet rays and weathering, and can be used on paper, metals and plastic.

Soap in the Orient: Lion Oils and Fats Co. (Tokyo) will make soap cakes from methyl ester, reportedly the first time this method has been used. The company's process is said to cut manufacturing time 50%, reduce costs (because the methanol can be recovered), and better preserve the soap's color and scent.

Opacifier for Cosmetics: Mona Industries, Inc. (P.O. Box 1786, Paterson, N.J.), has a new pearlescing and opacifying agent, Monapearl A, for use in shampoos, cosmetics, and lotion-type dishwashing detergents. The light-colored product is reported to have a strong pearling effect at low concentration, is soluble in hot mineral oils.

Spray Hand-Cleaner: Bankers & Merchants, Inc. (4410 North Ravenswood Ave., Chicago), is marketing Faymus Foam Hand Cleaner, which

reportedly removes ink, oil, grease, paint, gums, and difficult stains, without water or scrubbing. It's also claimed to be non-oily, odor-free, lanolin-enriched. An 11-oz. aerosol sells for \$1.29.

Liquid Cleaner: The Colgate-Palmolive Co. (New York) is selling a concentrated liquid cleaner, Liquid Ben Hur, for hard surfaces. The new compound does not form a scum when used with hard water, contains no alkaline salts. Addition of ammonia to the solution converts the product into a wax-stripper. It is available in 1-gal. cans and 5- and 55-gal. drums.

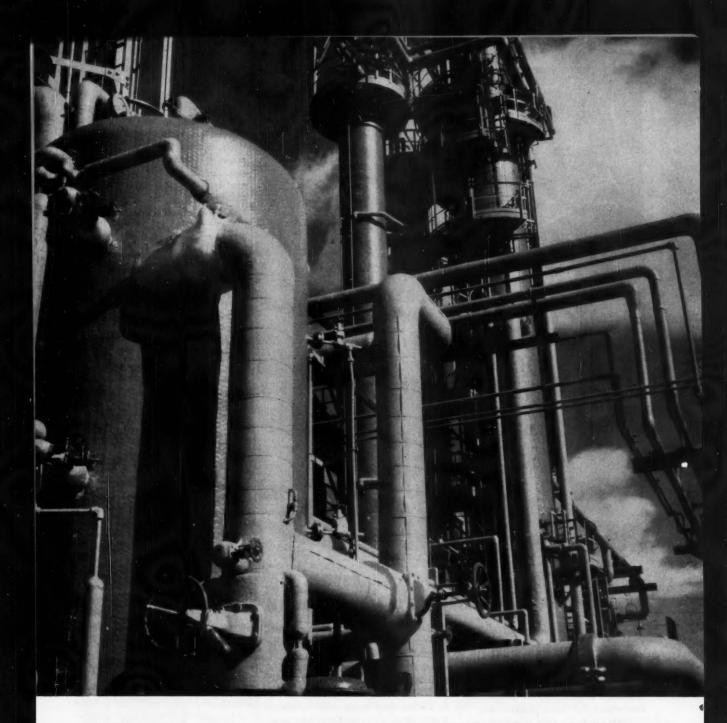
Odorless Shoe Polish: Esquire Shoe Care Products (Brooklyn, N.Y.) is now marketing its Esquire Boot Polish in what is claimed to be an odorless form. Esquire says its new formulation gives a better shine and has better shelf life than conventional products. Colors include brown, black, tan, ox-blood, charcoal brown, cordovan, and olive. Price: 29¢/can.

Snake Repellant: Animal Repellents Inc., a new corporation in Griffin, Ga., has begun marketing of a snake repellant and reptile-icide called Snake-Stop. The material comes in granular form and is intended to be applied at the rate of 1 lb./420 sq.ft.

Smudgeproof Carbon Paper: Remington Rand Machines-Supplies Division, Sperry Rand Corp. (New York), has developed a smudgeproof carbon paper that uses a coating of plastic-lacquer. It's said to outlast conventional carbon paper three to one. It can be used for manual and electric typewriters, is tradenamed Everlastic Carbon Transfer Tissues.

Dairy Detergent: A new concentrated, multipurpose liquid cleaner for dairy farm, food plant, and household cleaning has been added to Pennsalt Chemical's (Philadelphia) line of cleaners. Pen-Glo is a nonionic, high-sudsing emulsifier said to remove butterfat and milk films and to soften milkstone. It is available in 5-pt. jugs.

Hygienic Spray: Menlo Park Laboratories (Edison, N.J.) has introduced an aerosol vaginal cleanser, Vaga-Spray, claimed to be the first in the



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Another demonstration of how well Aloyco Valves withstand the worst kind of corresive conditions...many more years of service are expected.

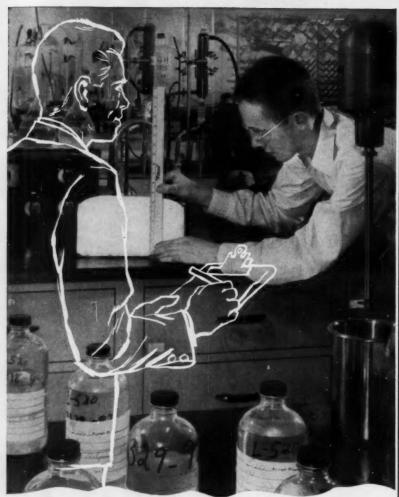
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Every production batch of UNION CARBIDE L-520 Silicone Surfactant for one-shot polyether foams is thoroughly laboratory tested. This way, your Silicones Man can be sure it is always uniform in the properties important for foam production.

Tests are made on a standard oneshot foam formulation. The L-520 must meet minimum requirements for foam rise, settling at the height of the rise, foam uniformity, and freedom from splits.

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the varying production conditions encountered in plants all over the country. But it does assure you of constant uniformity in the significant surfactant properties. The dependable uniform performance of L-520 has done much to bring about widespread acceptance of the one-shot polyether foam process.

For complete data, write Dept. IC-4002, Silicones Division, Union Carbide Corporation, 30 E. 42nd St., N.Y. 17, N.Y. (In Canada: Union Carbide Canada Limited, Toronto 7)

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SPECIALTIES

U.S. and designed to replace the vaginal douche. It can be used as a cleanser, both pre- and post-operatively, and as a spermicide with the diaphragm technique. The formulation contains two surface-active ingredients that have bactericidal, bacteriostatic, detergent, lubricant, and spermicidal properties. Product is released as a soft foam from a plastic-coated glass bottle.

Electroplating Cleaner: Turco Products, Inc. (24600 South Main St., Wilmington, Calif.), is selling an alkaline platers' cleaner, Surj, said to both clean and remove light rust prior to plating. Surj requires no extra equipment, can be used in either hard or soft water in mild steel tanks.

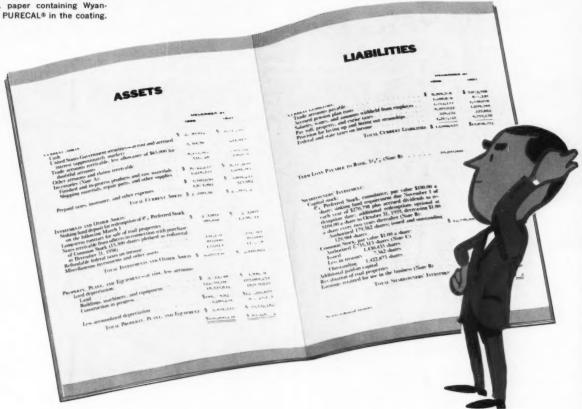
Sanitary Floor Polish: Puritan Chemical Co. (916 Ashby St., N.W., Atlanta Ga.) has developed a bacteriostatic floor polish that's said to fight germs and prevent their regrowth as long as the polish is on the floor. Plexin is a self-polishing, nonskid finish, can be applied with applicator or mops to wood, terrazzo, marble, cork, rubber, linoleum, asphalt or vinyl floors.

Water-Softening Resin: Duolite C-27, a new water-softening resin, is now available from Chemical Process Co. (1901 Spring St., Redwood City, Calif.). Particle-size distribution of the porous opaque resin is designed to allow high flow rates with minimum pressure drop. Operating capacity of the product is as great as 10% over that of other resins.

Lanolin Derivative: American Cholesterol Products, Inc. (Amerchol Park, Edison, N.J.), is producing Solulan C-24, a stable, water-soluble and alcohol-soluble form of cholesterol. The product may have application in hair and scalp formulations and in a variety of pharmaceuticals.

New Emulsion: Colton Chemical Co. (1747 Chester Ave., Cleveland) has developed Vinac AA-63, an emulsion to improve adhesive formulations. It is reported to be compatible with solutions of fully hydrolyzed polyvinyl alcohol, and to give higher water resistance to finished adhesives. Other characteristics: good mechanical stability, low viscosity index.

Printed by offset lithography on 80-lb. paper containing Wyandotte PURECAL® in the coating.



Which side of the balance sheet would you put technical service on?



Actually, and possibly properly so, Wyandotte technical service is not listed as such on either side of our balance sheet, or yours.

At Wyandotte, technical service is a philosophy of doing business. It is a desire, and an effort to be helpful . . . in any way possible. It is an attitude of constructive discontent . . . "There's always a better way. Let's find it!"

Overly optimistic? Perhaps . . . but productive of results!

When you put Wyandotte technical service to work it will-or should-show up on your balance sheet in the form of extra sales and

For example: Will a different form of one of our products effect economies in your operation? Are your specifications taking advantage of all of our technical knowledge and product development-to improve your products or to meet competition? Wyandotte technical service is designed to explore questions like these, and others, and make specific recommendations.

Are your facilities for unloading, storing, and handling bulk chemicals as safe and efficient as possible? If not, we'll be happy to help analyze your problems, and suggest improvements.

These are but a few of the functions of our technical service. You can't always classify them . . . but they do have the common purpose of helping you profit fully from the use of our products.

For a pictorial presentation of technical service at work, please turn the page.

SODA ASH . CAUSTIC SODA . BICARBONATE OF SODA . CALCIUM CARBONATE . CALCIUM CHLORIDE . CHLORINE . MURIATIC ACID . HYDROGEN . DRY ICE GLYCOLS . SYNTHETIC DETERGENTS . SODIUM CMC . ETHYLENE OXIDE . ETHYLENE DICHLORIDE . POLYETHYLENE GLYCOLS . PROPYLENE OXIDE PROPYLENE DICHLORIDE . POLYPROPYLENE GLYCOLS . DICHLORODIMETHYLHYDANTOIN . CHLORINATED SOLVENTS . OTHER ORGANIC AND INORGANIC CHEMICALS

Sales follow-up and follow-through



.. an example of Wyandotte technical service at work



1 A Wyandotte salesman's report indicates that a household-detergent maker is going all out to develop a formulation with low-foaming and maximum detergent properties. Technical service goes into action.



2 Samples of eight grades of Wyandotte Pluronic® block-polymers, data sheets and technical literature are mailed to the research director of the firm. These grades are known to produce the required properties.



3 The literature mailed included Wyandotte's Pluronic Grid*—a graphic description of the properties of all the Pluronics. The technical service man follows up, goes over the Grid with the research director.



4 The eight Pluronics samples are then put through their paces in the company's laboratory, with the Wyandotte technical service man on hand during the final stages. A combination of two Wyandotte Pluronics is soon found to have the best balance of desired properties.



5 Shortly afterward, the first mixed truckload of the two Pluronics is shipped. Schedules are carefully checked. Customer is notified of shipment and its time of arrival.



6 At lunch several weeks later, the technical service man and the research director discuss minor problems encountered in full-scale production of the new household detergent.

Following up the sale is just one of the many functions of Wyandotte technical service. Packaging, shipping, safety, handling, storage, new products, new applications, product improvement, better procedures—and more—all fall within the realm of technical service. All come under the heading of giving each Wyandotte customer or prospective customer the service and technical assistance he needs to best use the Wyandotte products he buys.

If you have a problem that falls within our technological or manufacturing background, check with us . . . our approach is designed to provide answers. Wyandotte Chemicals Corporation, Michigan Alkali Division, Wyandotte, Michigan. Offices in principal cities.

*If you would like a copy of the Wyandotte Pluronic Grid, just send a note to the address above.

Wyandotte CHEMICALS

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Technology

Newsletter

CHEMICAL WEEK
September 24, 1960

There's another official entry in polycarbonates. Union Carbide Plastics last week confirmed a development-stage interest in the field. Preferring to call its products "phenoxy compounds" to distinguish them from products of General Electric or Bayer, it said in effect: The company has had an interest in these materials for some time. It had started to field test them, but withdrew them because the firm's patent applications had been "anticipated by applications of others." It now has several new "phenoxy materials" in the lab and expects to be ready for field testing in the near future.

It has long been apparent that Carbide was preparing an entry into the field. Its Polymer X was believed to have been a polycarbonate (probably with small amounts of terephthalic and isophthalic acids). An Australian patent application described a somewhat different type of polycarbonate (CW Technology Newsletter, Aug. 20).

In any case Carbide's admission rounds out a full week of news on polycarbonates (see pp. 24 and 78).

A process for hydrogenating residual petroleum oils to yield gasoline and furnace oil will soon go commercial, according to its developer, Hydrocarbon Research Inc. (New York). HR reports that it is now negotiating to license the process to an undisclosed firm, expects to see the process in operation in late '61.

The new H-Oil process combines an ebullating catalyst bed, internal recycle and catalyst staging to solve the technical difficulties of previous hydrogenation methods.

Up to now, residual oils have always been sold as such (or used in coking), except when the Germans used very costly hydrogenation schemes to obtain gasoline during World War II. The new method is said to overcome the tricky technical problems—e.g., high temperature and pressure, catalyst handling and excessive hydrogen consumption. In HR's process, about 1,000 cu.ft. of hydrogen/barrel of input will be required.

A new process for iron ore beneficiation went into operation last week at Humbeldt Mining Co. (Humbeldt, Mich.), jointly owned by Cleveland-Cliffs Iron Co. and Ford Motor Co.

The \$15-million plant, with capacity for 650 million tons/year of pelletized concentrate, will produce iron pellets containing 60-62% iron from previously unused Jasper hematit ore containing 30-35% iron. Ford is expected to use a large share of the output.

In the process the ore is crushed and ground to a fine powder and then sent through a flotation process to separate usable ore from gangue. The floated material is agglomerated by bentonite-binding and balling and the final step is heat treatment in a rotary system. This last

Technology

Newsletter

(Continued)

separation induces grain recrystallization to yield a high-strength pellet. Advantage of the pellet form is that blast furnace capacity is increased—reportedly as much as 30-50%. The process was developed by Allis-Chalmers Mfg. Co. (Milwaukee).

A high-density graphite that has two to three times the high-temperature strength of conventional graphites has been developed by Union Carbide's National Carbon Co. division. It is made by recrystallizing conventional graphite by a classified (by the Air Force) process, is structurally useful at 5500 F—1000 F higher than regular graphite. Initial use is in rocket nozzle inserts. But applications research is continuing.

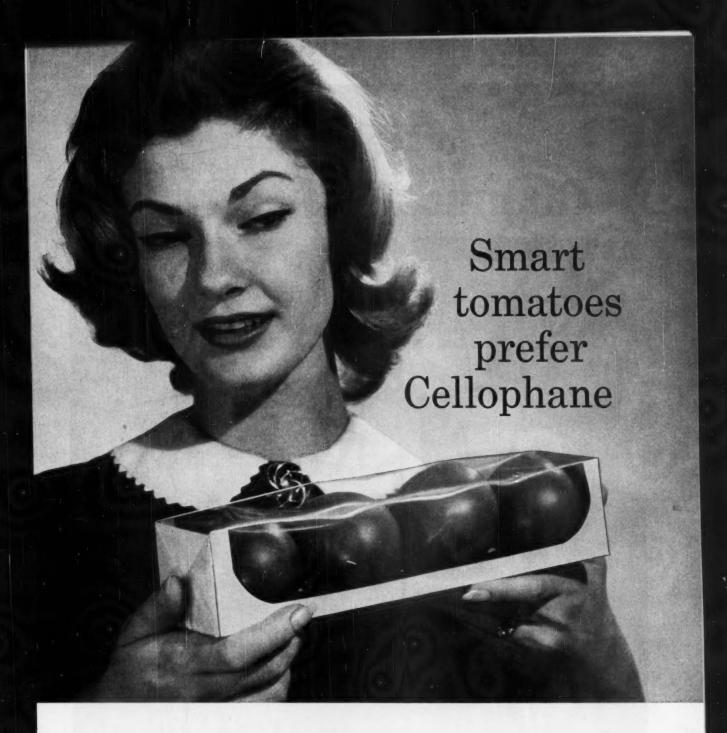
Elemental sulfur can be recovered from natural gas in a new process developed by Krell and Associates, Inc. (Houston, Tex.). Key steps are adsorption of natural gas (containing 10-30% hydrogen sulfide) with synthetic zeolites, desorption with sulfur dioxide, and catalytic reduction of the recovered hydrogen sulfide with the sulfur dioxide stripping gas. Molten sulfur is recovered from the reduction reaction.

Part of the sulfur is then burned to form sulfur dioxide, which is recycled to strip additional hydrogen sulfide out of the adsorption beds. During stripping, the beds are operated at about 600 F. They're permitted to cool to the temperature of the raw gas feed during the adsorption step.

Krell has two patents on the process in Canada and the U.S. It has also made an agreement with Western Sulphur Recovery Ltd. and Western Gas Technologists Ltd., which will act as process design engineers; also with Maloney-Crawford Tank & Service Co. Ltd., which will supply the equipment out of Calgary, Can. Patent rights in the U.S. have been assigned to Sulfur Recovery, Inc. (Houston).

Although the process has not yet moved out of the laboratory, the design for a "several"-tons/day pilot plant has been completed and construction is under way. Estimates based on lab tests indicate a commercial plant would have capital and operating costs considerably below those of conventional hydrogen sulfide recovery units. If so, the process could become an important factor in natural gas and sulfur output in the U.S. and Canada.

Outlook for commercial development of North Dakota's estimated 350 billion tons of lignite reserves is improving. The U.S. Dept. of Interior discloses this week that the Bureau of Mines Lignite Research Laboratory at Grand Forks has made several highly successful runs. The laboratory has been working since 1945 on a total gasification process (CW, Nov. 28, '58, p. 53) that will convert volatile matter from the solid lignite into ammonia, methanol, synthetic chemicals and fuel gas through a fluidized-bed gasification reaction. Ash in the lignite feed will be fused into slag at the bottom of the reactor, after which it is quenched and drawn off through a slag lock. The bureau has not yet determined the economics of the method.



Tomatoes enjoy flirting with pretty shoppers . . . and that's one reason why they go for cellophane in such a big way! It shows off their shape and color to best advantage while protecting freshness.

Cellophane's crystal-clear transparency and superior printability make it the ideal eye-catcher, the perfect display wrap. Cellophane keeps freshness inside, dirt and germs outside. It's by far the most versatile and popular of all packaging films... another example of the amazing virtues of cellulose.

For over forty years, Buckeye has contributed to the development of cellulose-based products for such industries as cellophane, tire cord, textiles, plastics, film and paper. Possibly we can help to improve your product with high quality dissolving pulps backed by our specialized research and service. Just call on us.

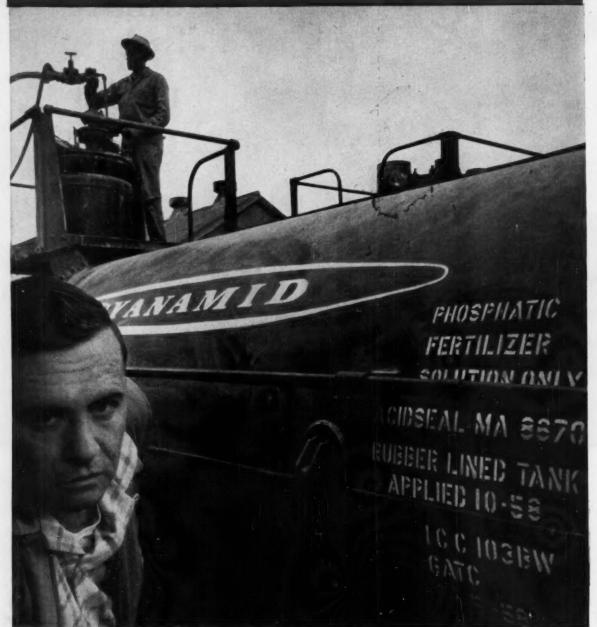
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Cotton linters plant at Memphis, Tennessee—Wood pulp plant at Foley, Florida

Buckeye first in cellulose

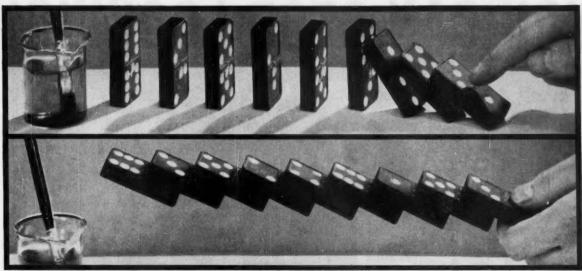
CYANAMID

Chemical Newsfront



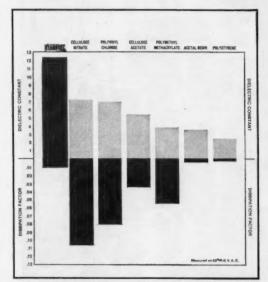
CYANAMID TO DOUBLE PHOSPHORIC ACID PRODUCTION. When a new multi-million dollar addition to its Brewster, Florida plant is completed, Cyanamid will be able to produce approximately 400,000 tons of wet-process 54% phosphoric acid annually. The new facilities will also provide an increased tonnage of triple superphosphate. This increase in the production of these new materials will assure prompt service to Cyanamid customers in all areas served.

(Agricultural Division)



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ELECTRIFYING NEWS! Cyanamid research has developed a chemically modified cellulose with remarkable electrical properties. Trademarked CYANOCEL*, the new product can be cast into film—molded at high temperatures and pressures. Graph (above) demonstrates the unusually high dielectric constant of CYANOCEL and low dissipation factor. Flexibility, physical strength and transparency, combined with outstanding electrical properties, make CYANOCEL particularly interesting to the electrical and electronic fields.

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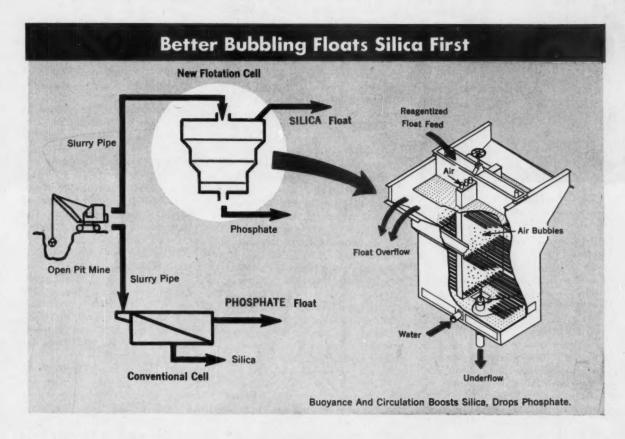
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Flotation Switch Cuts Phosphate Costs

The cell pictured here is the heart of a cost-cutting new phosphate-ore flotation process now being scaled up by engineers of Smith-Douglass Co. (Norfolk, Va.). Just-completed eightmonth-long tests have demonstrated that the process saves 30% in major equipment investment and 20% in operating costs—meaning extra profits for phosphate producers now meeting demands in the fast-paced fertilizer boom (CW, Aug. 27, p. 69).

Proposals for use of the new process are now being sought by four firms.

In pilot-plant runs, the phosphate recoveries were 95%—vs. 85% in other processes. This increase in efficiency means a possible \$8-million annual saving for Florida producers alone, and an additional \$4 million if the process proves applicable to types of phosphate rock in other parts of the country (Utah, for example, has a lower-grade rock).

Add investment and operating economies, and the total annual savings would come to \$13 million. This arithmetic takes on added meaning when a peculiarity of the phosphate mining industry is considered: plants must be continually replaced.

Phosphate plants are tied to the mines by the length of pipe through which the mine operators can economically pump an ore-water slurry. Therefore, when a mine gives out, a plant does not get its rock from a more distant mine; instead, the plant must be moved to a new, nearby mine.

The ore in the ore-water slurry fed to the plant is an intimate mixture of clay, silica (as sand) and phosphate rock containing about 25% phosphate (P_2O_5). All consumers need more-concentrated phosphate. The biggest consumer, wet-process phosphoric acid, which is used for fertilizer, requires 34% P_2O_5 .

The low price of wet-process acid is one factor in the current phosphate boom. In Florida, which accounts for about 70% of U.S. output, production during the last two years has grown from 11.4 million to 12.4 million tons. Sales were about \$70 million in '59.

Air and Amine: Like standard processes for copper, lead, nickel and silver, phosphate flotation separates out minerals by treating the ore slurry with a chemical that sticks to only one kind of lump. Phosphate is floated by an anionic chemical composed of ordinary fuel oil and fatty acid. Silica, which must be pulled out in order to concentrate the phosphate, needs cationic organic compounds—e.g., various kinds of amines—as the flotation agents.

In the new flotation process there is a switch in the order of flotation steps. Instead of floating phosphate first, silica is brought up first. Two



Silica, floated first in new process, overflows Hollingsworth cell.

steps are still needed because some product is always carried out with the waste and must be recovered in another flotation step. Also in this way the positive and negative particles can be lifted separately.

Key to this switch is the air-operated, no-moving-parts cell, called the Hollingsworth cell after its inventor, Smith-Douglass's research director, C. A. Hollingsworth. Ground phosphate ore, mixed with a chemical enters the feed distribution box at the top of the cell (see illustration). Water is forced through pinholes in rubber tubes on three levels of the cell. Combined action of the water, the air bubbles and the shape of the cell itself circulates the mineral suspension. About 10% more phosphate is recovered from the ore than in conventional cells, where an impeller usually stirs the suspension.

Flotation starts as an amine reagent coats the silica lumps, usually about ½2 in. in diameter. Since the amine has an affinity for air bubbles, a buoyant bubble of encased silica forms. This floats to the surface and overflows the cell. Phosphate, which does not have an affinity for amine, simply sinks to the bottom of the cell and is discharged through the underflow.

Switch Savings: In Florida's existing flotation plants the first flotation—for phosphate—is accomplished by addition of an oily reagent to the feed. This oil must be removed from the silica underflow before this silica slurry can be floated for phosphate in the second step.

Phosphate is floated first in these conventional plants because abundant

silica can be easily dropped out as underflow. If silica were raised first, interference by slimes would foul up a standard flotation cell and would result in use of excessive reagent. When silica is floated second a relatively small amount must be handled, easing the burden on the cell.

The Hollingsworth cell has been specifically designed to handle the silica first. The slime jam-up problem is solved by eliminating all moving parts in the cell. Excessive use of chemicals is no problem, for the efficient circulation in the cell brings silica up quickly.

Since silica is floated first, amine is the first reagent. Amine need not be filtered out of any slurry. Oil, used for the second flotation, need not be removed from the final step. So, deoiling equipment is saved. This means

oiling equipment is saved. This means no classifier, de-oiling equipment, primary de-oiling cyclone, and secondary screw classifier are needed. Thus maintenance is saved.

During the eight-month pilot-plant period just ended, a group of three cells was used for each of the two flotation steps. Over-all recovery through this system was faster, less wasteful and required less equipment. For example, the usual flotation process needs many sizing steps to sort the mined rock into particle sizes

To complicate matters the limits of particle size in the conventional process call for double grinding and classifying operations. In the new process the greater capacity and buoyancy of the cell permits a wide range of particle size, obviates sizing equipment.

compatible with flotation.

In addition to equipment reduction, the new process—because of its small number of moving parts—reduces maintenance expense. The only moving parts are in the pumps and conditioner, where chemicals are mixed with the feed, and in a cyclone, where slimes, which do not mix with the amine, are removed from the ore.

These savings, demonstrated in the pilot-plant study, may not be duplicated in commercial production. This, of course, would dim the appeal of the process. But its innate advantages are underscored by the four proposals now being sought. It's likely that only technical adjustments will be needed to assure acceptance.

Trickle Treatment

Details of Shell Oil's trickle desulfurization process, which desulfurizes petroleum stocks by passing them in liquid form down through a bed of catalyst, are coming to light. The company's new Houston, Tex., hydrotreater, utilizing the process, is the first hydrotreater to be operated on lube oil stocks, although Shell has two similar units operating on lighter products, one at Wood River, Ill., and the other at Shellburn, B.C., Canada.

The Houston unit handles 30,000 bbls./day of furnace oil or diesel oil and cost \$2 million to install. This comes to about \$70/daily barrel, a little high, considering that Shell engineers think their process is 20% cheaper on investment cost (and 1-2e/barrel cheaper to run) than equivalent treating processes. However, the Houston unit also includes a refluxed, steam stripping tower for flash-point control; this brings over-all prices closer to what might be expected for catalytic desulfurization.

Key to the process is Shell's fixedbed reactor employing a pelletized catalyst of undisclosed composition. Oil feed pumped from storage is blended for viscosity and flash point. After passing through a series of feedproduct exchangers and a vertical tube furnace, it is mixed with a 90%pure hydrogen stream that Shell brings from a nearby platinum reforming unit. Pressures and temperatures are regulated so that practically all of this hydrogen goes into solution in the oil. Mixing is done in the line.

From the mixer, the hydrogen-oil solution goes directly to the reactor, where it is distributed over the top of the catalyst bed through a sparger. Pressure in the reactor is about 600 psig., while the inlet temperature is about 700 F. Since the reaction is exothermic, the temperature goes up about 30 F as the oil passes down through the catalyst. Despite the increase in temperature, hydrogen remains in solution, since it simultaneously reacts with sulfur and nitrogen compounds.

About 90% of the sulfur and 60 of the nitrogen are converted into hydrogen sulfide and ammonia. The catalyst is virtually unaffected, being good for operating periods of about



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one year. When regeneration is required, it is taken out and deposits burned off with air and steam.

Hot oil leaving the reactors passes first through the feed-product exchangers to a two-stage flash system, where the hydrogen sulfide and ammonia are vaporized as the pressure is cut to slightly more than atmospheric. The waste hydrogen sulfide and ammonia vapors go to fuel, while the oil passes to the steam stripper for flash-point control. Overhead product from the stripper is recycled to the platinum reformer, while bottoms furnace oil or diesel oil product is sent to storage.

Although catalytic desulfurization is far from new (vapor-phase gasoline desulfurization over bauxite is fairly common and West Texas furnace oil is reported to have been desulfurized over clay) the hydrotreater's all-liquid process promises to go a long way in replacing conventional treating and sweetening processes. It avoids the heavy thermal load required for vaporizing the feed stock while it offers reforming-type desulfurization characterists of the catalytic processes.

New Coating Technique

The National Bureau of Standards (Washington, D.C.), in a Wright Air Development Center program, has developed a technique for producing nickel-aluminum coatings capable of protecting metals from oxidation at temperatures up to 1800 F. Because of its brittleness, nickel-aluminum cast alloy is difficult to fabricate; electroplating avoids this problem. Nickel is electrodeposited on a metal by using a chloride-sulfate bath. Then, aluminum is diffused into this nickel layer by electroplating at a current density of 2 to 15 amps/dm2 from a 1300 solution containing potassium chloride, sodium chloride and cryolite (sodium aluminum fluoride). The period of time for electrolysis is critical; after a while, the aluminum may electrodeposit faster than it can diffuse into the nickel. For the metals that cannot take 1300 F, aluminum is deposited over the nickel at 320 F and then alloyed with the nickel by heating for a few hours at 900-1100 F. Protective coatings made this way have been found suitable for steel, nickel and molybdenum.

New Computer System

A programing system using simple English words to instruct an electronic computer, instead of the complicated jargon now used, has been developed by Radio Corporation of America (New York). The new system, which reportedly cuts programing time in half, was created in response to a Dept. of Defense request. Defense asked a committee of computer manufacturers to develop one, over-all computer programing language adaptable to all computer equipment. This committee also will decide whether RCA's system would serve as the universal business language, which will be named COBOL (Common Business Oriented Language).

As an example of RCA's system, an instruction such as "Subtract deductions from gross, giving net" replaces three numerical instructions: 72-010237-00-600000 and two other numbers equally long.

Metal Process Improved

Electron-beam processing is now being used to improve the properties of forgeable tungsten and molybdenum. Stauffer-Temescal Co. (Richmond, Calif.), a subsidiary of Stauffer Chemical Co., developed the technique.

The metals are being used for exhaust nozzles and other components in missiles and for well-head equipment in oil fields. Right now, the firm reports, it is making ingots up to 42 in. long and 8 in. in diameter at prices competitive with those of metals processed by conventional electric-arc methods.

S-T engineers report that for the first time they've been able to cut down the size of crystals in cast tungsten and molybdenum ingots. The traditional large size of grain is blamed for making these metals brittle and tough to fabricate. The new grain structure boosts shock resistance and makes the metals easier to shape by increasing ductility and workability—all without impairing strength characteristics.

In conventionally produced metals—with electric-arc furnaces—the large-grain structure allows small cracks starting along the edge of a crystal to quickly find a long common plane between adjacent crys-

tals. This can lead to a long crack in the metal. By reducing the grain structure many random crystals are formed. This breaks up the common planes and blocks the chance of long cracking. Result: improved ultimate strength and a decrease in the amount of cold forging needed for the finished ingot.

The new method combines electronbeam processing (CW, March 7, '59, p. 39) with critical composition control. The special electron-beam furnace that's used is an extremely highvacuum chamber, custom designed with special furnace valves and pumps.

How It Works: A crude metal bar placed in the chamber is melted by an electron beam. As the bar or ingot melts, the molten metal drips down into a water-cooled crucible. Impurities are vaporized and drawn off into the vacuum while the pure metal solidifies.

Stauffer-Temescal also says that it has reduced grain size in a number of refractory metal alloys such as tungsten-tantalum (CW, March 19, p. 66).

The limited commercial quantities now available are being expanded to meet the anticipated market requirements.

Polycarbonate Spurt

Last week General Electric's Chemical Materials Dept. (Mt. Vernon, Ind.) started up an estimated \$5-million polycarbonate resins plant. In the coming year this unit, which is the fruit of four years semicommercial pilot-plant study, will put out about 5 million lbs. of resins bearing a unique combination of properties already in action in over 300 commercial applications.

This 5 million lbs., plus undisclosed production from a Mobay Products Co. plant (New Martinsville, W. Va.), puts added thrust in the plastic industry's trend towards specially engineered, high-performance resins (CW, July 9, p. 73). Unknown to GE, Farbenfabriken Bayer AG. (Frankfort, Germany) came up with a technique for commercial-size production of polycarbonates at almost the same time. However, neither side is sure how the other firm does it. Bayer gave its know-how to Mobay. its U.S. affiliate. Latest development is a cross-licensing agreement in which both GE and Mobay might license

Check into Airco's new VINOL polyvinyl alcohol resins

IN THESE FIELDS >	ADHESIVES*	TEXTILES	PAPER	PLASTICS	SPECIALTIES
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APPLICATIONS		thermosetting	paper	water	binders
	types	modifiers		soluble	OTHERS
	colloidal thickeners	non-permanent types		grease resistant	photosensitive coatings
	*Supplied to the adhesives industry by Colton Chemical Co.,	permanent types	paperboard	solvent resistant	protective coatings for metal, plastics
	Division of Air Reduction Co., Inc.	binders		gas imper- meable	steel quenchant

Airco VINOL — a group of polyvinyl alcohol resins tailored for specific uses — offers advantages for a variety of industries. Available soon, Airco VINOL will open new possibilities for improving products and processes in such competitive fields as those listed above.

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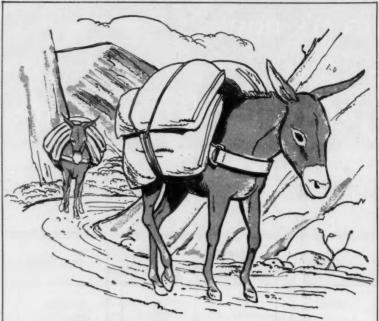


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ENGINEERING

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All this interest over polycarbonates stems from a set of high-powered, special-purpose properties, rather than from over-all applicability. They can be tailored for dimensional stability, impact strength, ductility and low water absorption, making them suitable for applications such as business machines, electrical appliances, automobile parts and photographic equipment. Transparent and thermoplastic, they lend themselves to almost all the standard production methods such as injection molding, extrusion, blow molding, vacuum forming and cold forming. And they can be drawn, forged and stamped in the usual metalhandling techniques. Since they will not support fire, they are expected to find additional uses as Underwriter Laboratories cracks down on the use of flammable resins for household products.

Higher Priced: Polycarbonates cost about one and a half times as much as similar plastics such as polyamides and polyformaldehyde. But their special properties are expected to make up the difference in many instances where other plastics can't handle the job.

The basic reaction of polycarbonate manufacture combines phosgene with bisphenol-A, producing the polycarbonate resin along with hydrochloric acid. The hydrochloric acid is separated out in a purification step, and the resin recovered by extraction with undisclosed solvents. Blending, color addition and pelletizing complete the process. This is all done in a plant codeveloped with Crawford & Russell, Inc. (CW, Aug. 20, p. 62). Features include a semiopen plant structure; extensive use of polyethylene and other plastic piping; solvent recovery in an inert gas system. Glass lined vessels are used extensively.

GE expects its product, tradenamed Lexan, to find ready markets and has built 100% overdesign into the new plant. In addition, space has been provided for a mirror-image production line, doubling the whole operation to 20 million lbs./year. The phosgene plant supplying the polycarbonate plant has also been contracted for double its initial production output; it is expected on stream in early '61.

Market forecasts predict 12 million lbs. in '62, 30-50 million in '65 and 70-100 million by '70. At the same

time, GE estimates that the current price of \$1.50/lb. will drop to about $90\phi/-1.20$ in '62 and level off at about $60-85\phi/lb$.

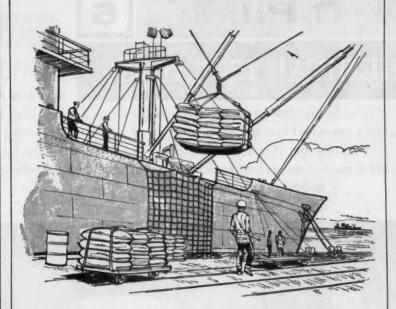
Although GE and Mobay may find their markets cornered by strong competition (Union Carbide and Columbia-Southern are racing through pilot studies), the inherent qualities of polycarbonates are sure to add a dash of spice to the plastics industry.

PROCESSES

Mineral Fertilizer: A new process for making mineral fertilizers out of molten magnesium phosphate has been claimed by The Kazakh Academy of Science's Institute of Chemistry (Moscow). The process uses a magnesium trachinate salt, as an additive and smelts phosphorites in a cyclone furnace originally designed for smelting copper concentrates. Tass claims the technique is highly efficient, lends itself to automation. The end-product is said to be completely defluorinized and thus useful for stockbreeders. But the fertilizer contains only one-half as much phosphoric acid as superphosphates.

oil Well Fracturing: Fracturing—exploding bulletlike pellets into the walls of run-out oil wells—is getting a boost from Atlantic Refining Co. and Reynolds Metals. They have found that the use of aluminum pellets (called "fracshot") will increase production by as much as 250%, compared with 0-15% for sand, iron and other types of pellets. Key to fracshot's success is the pellets' malleability. The pellets open cracks in the stone side of the well formation and keep them open without being crushed under the pressure.

Use for Sulfite Liquor: Engineers from Banska Bystrica Cement Factory (Slovakia, Czechoslovakia) report a new use for waste sulfite liquor from pulping. They mix the liquor into cement for concrete blocks. The waste liquors, mostly acid or neutral containing about 92% combustible matter, reduce the viscosity of the cement slurries, which in turn allows use of 30-40% less water in the mix going to the curing ovens and cuts fuel loads by about 12%. The exact proportions of sulfite liquor mixed into the slurry is not known.



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CHEMICAL ISOLATION

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isolation methods have been developed through ion exchange chromatography. The two processes presented here are notable not only for their high resolving power but also for their low cost of operation. In both of these processes, the fact that no chemical regenerant is needed means that each may be profitably employed where ordinary ion exchange methods would be impractical.



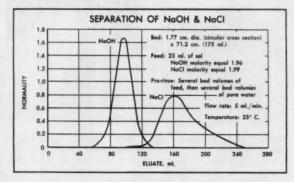
ION RETARDATION

ION RETARDATION OFFERS LOWER COST IONIC SEPARATIONS

Ion retardation is a process based on an entirely new and unique class of ion exchange resins. These are amphoteric (bifunctional) resins containing both anion and cation adsorption sites. These sites have an attraction for each other, but will also associate with mobile anions and cations in solution. However, when these mobile ions are adsorbed, they may be eluted simply by rinsing with water. Since ion retardation eliminates the cost of chemical regenerants, it may be profitably employed where ion exchange is impractical, especially where high concentrations of ions are involved. Though applicable to ionic-ionic separations such as the purification of water soluble organic compounds contaminated with salts, ion retardation is especially unique in its ability to make clean fractionations of ionic-nonionic mixtures. The chart shows an excellent separation of strong electrolytes using Retardion® 11A8, a Dow ion retardation resin.

Since ion retardation is based on the reversible adsorption of electrolytes, good separations of ions from very large organic molecules may be obtained. Retardion 11A8 resin, made by polymerizing acrylic acid inside Dowex® 1 (a Dow strong base

quarternary-ammonium resin), has an essentially neutral character which makes it particularly useful for the processing of pH-sensitive compounds. For a specific analysis of the applicability of ion retardation to your processing operation, write to Dow at Midland.



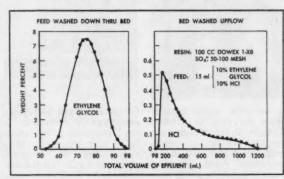
ANION SULFATE PROCESS

EQUILIBRIUM PHENOMENON OFFERS NEW METHOD FOR REMOVING STRONG ACIDS FROM SOLUTIONS

Another highly capable ion exchange process which requires no chemical regenerant (except water) is known as the "anion sulfate technique." The process may be used for the separation of strong acids from weak acids, from water soluble organic materials, and from certain salts. The unique new method is based on the fact that the sulfate form of a quaternaryammonium anion exchange resin, such as Dowex 21K resin, possesses the acid-adsorbing properties of a weakly basic exchange resin. The equilibrium composition of this resin in a solution of sulfuric acid is a function of the acid concentration. If the solution is dilute, the resin shifts to the sulfate form; if concentrated, to the bisulfate form. Hence the quaternary ammonium anion exchange resins will adsorb acids from concentrated solutions, and the acid may be removed by eluting the column with water (an infinitely dilute acid) which converts the resin back to the sulfate form.

Any strong acid may be removed by this process, not just sulfuric. With HCl, for example, the Cl^- displaces SO_4 from the first resin particles it contacts and is therefore preceded by a sulfuric acid band in which the conditions are

identical with those above. The bed is regenerated to the sulfate form by reversing the direction of the water wash. An example is shown in graph form. For further information, mail coupon or write, stating your problems to THE DOW CHEMICAL COMPANY, Midland, Michigan.



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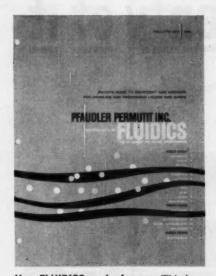
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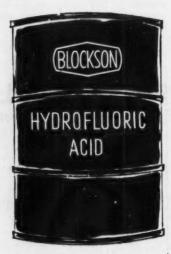
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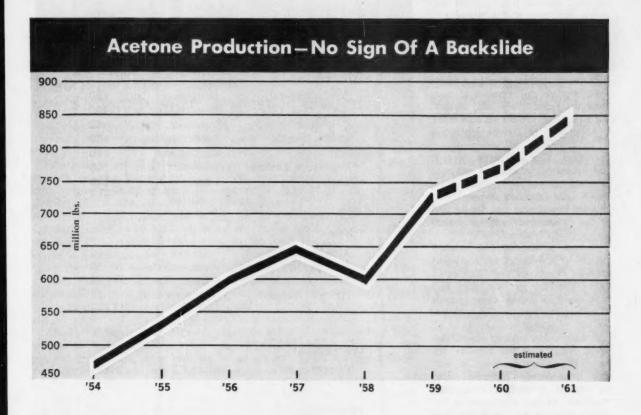
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Acetone: Comfortable Fit or Oversupply?

Last week total U. S. acetone capacity climbed over the 1-billionlbs./year mark as two new expansions went into place.

Enjay, a division of Humble Oil & Refining Co., disclosed it has just completed a 110-million-lbs./year acetone (from isopropanol) plant at Humble's Bayway refinery at Linden, N.J. Chances are that Enjay is preparing to become the country's third producer—along with Union Carbide and Shell Chemical—of methyl isobutyl ketone, biggest end-use of acetone.

Earlier this week Allied Chemical started feeding cumene (from Texaco's Eagle Point plant at Westville, N.J.) into its just-completed Frankford, Pa., phenol unit. By the end of this month Allied expects to be producing phenol at capacity rate of 50 million lbs./year—yielding 30 million lbs./year of co-product acetone. The new addition doubles Allied's acetone capacity at Frankford to 60

million lbs./year and will make Allied the largest acetone producer by far using the cumene route.

Meanwhile, there are strong indications that Shell Chemical and Hercules Powder also will expand their acetone capacities. There's also industry talk that Monsanto once again is contemplating a move to become the fifth phenol-from-cumene producer—a logical step, since Lion Oil, a Monsanto division, could supply the necessary raw material. Monsanto's potential acetone output would likely be for captive use.

Production vs. Capacity: Comparing acetone capacity with production figures gives the misleading impression that the market is flooded. But the supply-demand situation can be more accurately termed a comfortable fit rather than an oversupply. With estimated '60 capacity of over 1 billion lbs., production is expected to reach 770 million lbs. this year, compared with just over 736 million

lbs. in '59. Output should reach 900 million lbs./year by '64, pass the 1-billion-lbs. mark about a year later.

Acetone may be derived from (1) isopropanol; (2) as a co-product with phenol via the cumene route; (3) through oxidation of liquefied petroleum gas (LPG); or (4) as a by-product in the fermentation manufacture of butyl alcohol.

Acetone from isopropanol will account for more than 80%—625 million lbs.—of total acetone production this year. Four producers use this route. Shell and Union Carbide together produce close to 90% of the supply; Tennessee Eastman turns out 60 million lbs./year and Enjay previously produced a small amount from its methyl ethyl ketone facilities before its new unit went onstream. These units, with a capacity to turn out an estimated 767 million lbs. of acetone this year, are operating at 80-85% of capacity.

Only a modest part of this iso-

propanol acetone is by-product material—that from Shell's Norco, La., plant, which produces hydrogen peroxide with acetone as a co-product. Shell will eventually also turn out allyl alcohol from acrolein and IPA, with more acetone as a by-product. From there it will produce glycerin from the peroxide and allyl alcohol, but these stages are not yet completed.

About 10% of acetone production is as co-product of cumene-phenol operations. Cumene (from benzene and propylene) is oxidized and split to yield acetone and phenol in a 3-to-5 ratio. Acetone is now being churned out at near capacity because of the simultaneous surging demand for co-product phenol.

Oronite, a subsidiary of Standard Oil Co. of California, has completed phenol expansions in Richmond, Calif., over the last few years that have edged its acetone capacity from 21 million lbs./year to at least 30 million lbs.

Although Hercules at its Gibbstown, N.J., plant has capacity for some 18 million lbs./year of acetone from cumene (increased from an original 15 million lbs.), trade observers say that production is frequently blocked off (about one-third of the time) to permit production of paracresol. Shell in Houston, Tex., and Allied round out the list of producers starting with cumene.

Oxidation of LPG by Celanese is the source of up to 35 million lbs./-year of acetone. Output from this single route will—like cumene-phenol production—likely run close to capacity this year.

Publicker Industries (Philadelphia) is the only producer deriving acetone by the fermentation process (until the '30s, almost all acetone was obtained this way). Publicker has a capacity of about 45 million lbs./year, but production would approach this level only if demand for butyl alcohol were stepped up enough to warrant full-scale production. Right now only about 25% (10 million lbs.) of Publicker's acetone potential is utilized.

Inventory and Price: Inventories last year very nearly dried up, despite a pickup of more than 20% in production in '59 vs. output in recession year '58. With '60 production up only about 4% over '59—reflecting' a growth similar to that of acetone demand—there can be little

Acetone in '61 will come from here:

	(estimated ca millio	pacity, n lbs.)
Isopropanol:		
Shell Chemical	Dominguez, Calif.	150
	Houston, Tex	180
	Norco, La	82
Union Carbide	Texas City, Tex	150
	Whiting, Ind	120
Tennessee Eastman	Kingsport, Tenn.	110
Enjay	Linden, N.J	852
		032
Cumene:		
Allied Chemical	Frankford, Pa	60
Standard Oil (Calif.)	Richmond, Calif	30
Shell Chemical	Houston, Tex	24
Hercules Powder	Gibbstown, N.J	18
		132
LPG oxidation:		
Celanese	Bishop, Tex	3
Fermentation:		
Publicker Industries	Philadelphia, Pa.	4
	Grand total	1.06

And be consumed as follows

Derivative solvents:	
Methyl isobutyl ketone (MIBK) Methyl isobutyl carbinol (MIBC) Others (mesityl oxide, diacetone, hexylene	21% 10%
glycol, phorone, isophorone, etc.)	12%
Methyl methacrylate	14%
Drugs, vitamins, misc. chemicals (bisphenol-A, acetyl acetone, etc.)	12%
Solvent uses:	
Paint, varnish, lacquer	10%
Cellulose acetate	5%
Acetylene	4%
Misc. solvent uses	11%
Exports	1%

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Trialkyl boranes: new isomerization-polymerization catalyst

The alkyl groups of Trialkyl Boranes isomerize at temperatures on the order of 160°C.

This permits use of Trialkyl Boranes in exchange reactions to isomerize internal olefins to terminal olefins. In addition, either type of olefin may be used to produce terminal (primary) alcohols by oxidation of the isomerized Trialkyl Borane. For example: mixed hexenes give a ninety per cent yield of l-hexanol by this process. These reactions have potential application in the petro-chemical, pharmaceutical, fatty acid and essential oil industry.

Trialkyl Boranes also promote polymerization of vinyl-type monomers at lower temperatures than are practical with other catalysts.

The result is increased regularity in the polymers. Thus, vinyl chloride is polymerized to a product that is insoluble in solvents for conventional poly (vinyl chloride). Among other compounds polymerized by Trialkyl Boranes are methacrylic and acrylic esters, acrylonitrile, styrene. Emulsion polymerization is possible because Trialkyl Boranes do not react with water.

Oxidizing agents, including air, must be avoided, but otherwise boron carbon bonds are very stable.

Triethylborane and the higher Trialkyl Boranes are generally soluble in hydrocarbons, insoluble in water, and not reactive with either. They are miscible with most organic solvents. Trialkyl Boranes are reducing agents at higher temperatures. Spontaneous flammability decreases as the molecular weight of the n-alkyl group increases.

If you'd like our Technical Bulletin C-310 or Handling Bulletin C-311 on the Trialkyl Boranes, just fill in the coupon below.

Unique hydroborationisomerization reaction for producing alcohols

Amine-Boranes rapidly, efficiently, and conveniently shift internal olefinic unsaturation to the terminal position. This hydroboration-isomerization reaction can be used as a unique method to convert olefins to Trialkyl Boranes, and, by subsequent oxidation, to primary or secondary alcohols.

Dimethylamine-Borane, (CH₃)₂NH: BH₃; Trimethylamine-Borane, (CH₂)₃N:BH₃ (white solids), and Pyridine-Borane, C₄H₂N:BH₃ (a light amber liquid) are available now. Other Amine-Boranes with longer alkyl groups can be prepared.

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With a heat of combustion of 31,000 Btu/lb and extremely good combustion properties, Diborane is an attractive fuel for air breathing engines. Diborane, a gas at standard conditions, can easily be liquefied (boiling point -134°F). With modern insulating methods, it can be stored for long periods. Its specific gravity at a temperature slightly above its melting point (-265°F) is 0.56, so that it contains more Btu/gallon than JP fuels. Diborane has excellent heat-sink capabilities.

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Two acid hydroxy groups for esterification with alcohols

Ready esterification by Alkyl Boric Acids of residual hydroxyl groups, as in poly (vinyl alcohols), imparts water resistance and toughness to the resulting films and fibers. As a bonus, the boron may add some flame resistance to the polymer. The two acid hydroxy groups present obvious opportunities for esterification with numerous alcohols. The resulting esters should be resistant to oxidation and hydrolysis.

Nonyl and Dodecyl Boric Acids are miscible in hydrocarbons, ethers, and ketones. We also have available a number of other Alkyl Boric Acids with from 4 to 18 carbon atoms in the alkyl group and with corresponding variation in degree of non-aqueous solubility.

Nonyl and Dodecyl Boric Acids appear to be quite stable to either acid solutions or alkaline aqueous solutions at ordinary temperatures. Autoclave conditions, about 150°C, are required for hydrolysis.

For a more complete rundown on characteristics and properties of Alkyl Boric Acids, check coupon below for Technical Bulletin C-710.

New color improver

The slow reduction of carbonyl groups can prevent their accumulation and later formation of acids and color in systems susceptible to autoxidation. For example, a low concentration of Pyridine-Borane as a synergist with N-methyl pyrrole can prevent discoloration of perchloro solvents. Trace quantities of carbonyl found in oxo-alcohols can be "cleaned up" by small amounts of Amine Boranes.

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MARKETS

replenishment effected until sometime next year.

The 140-million-lbs. addition to the acetone market this month, plus several potential expansions, should relax what might have turned into an acetone squeeze. It will allow producers enough leeway to stockpile acetone to avert a '61 shortage.

Acetone pricing has always been at a comparatively low level (now at 8¢/lb. after Tennessee Eastman initiated a ½¢/lb. cut late last June) and will likely continue to remain at a bargain price for the CPI.

Some industry experts believe that the early '60 price level will be reestablished with the first pronounced upturn in general business.

By the same token, a benzene price hike would similarily boost acetone tabs. Other observers, however, point to upcoming expansions, and scoff at the possibility of a price increase.

End-Uses: Derivative solvents have traditionally been the greatest end-use for acetone, this year accounting for almost half—an estimated 43%—of the supply. Leading the parade of end-uses is methyl isobutyl ketone (MIBK) and methyl isobutyl carbinol (MIBC), which together soak up 230 million lbs./year, almost one-third of annual acetone output. The 155-million-lbs./year MIBK market—usually pictured as one approaching a plateau—will become more competitive if Enjay steps into the business (competing with Shell and Union Carbide).

The methyl methacrylate market —which this year will consume at least 100 million lbs. of acetone, some 14% of total consumption—has until now been dominated by Rohm & Haas and Du Pont. A third producer, Escambia Chemical Corp., has been turning out methyl methacrylate monomer in semicommercial quantities at its Pensacola, Fla., pilot plant since June. Construction of a commercial-size methacrylate plant is scheduled to start next year; onstream date has been set for mid-

But since Escambia will pioneer a process utilizing oxidation of isobutylenes and won't use acetone as a raw material, there is conjecture that this move may, in effect, neutralize the increasing volume of acetone being channeled into methacrylate production. This, however, will be the

case only if Escambia produces quantities of the monomer sizable enough to 6 ont the market and then only if it can turn up a marketing setup effective enough to compete with R&H and Du Pont.

Primary methacrylate uses are in coating materials; next, extruded flat sheet, laminations and adhesives.

The two-producer monomer capacity is more than 170 million lbs., of which more than 100 million lbs. is that of R&H. Some estimates place production as high as 150 million lbs. this year.

While still a relatively tiny chunk of the acetone end-use pattern, bisphenol-A has seen the most growth. It's the major component of epoxies and a necessary ingredient in polycarbonates. Output of the material will this year surpass 50 million lbs., more than double the figure of four years ago. This adds up to some 15 million lbs. of acetone in '60, and is expected to swell to 20 million lbs. by next year.

Exports, once high but since dwindled considerably, have been picking up by small amounts each year since '55. Even so, overseas shipments probably have reached a peak and will level off at 7 or 8 million lbs./year. About 8 million lbs. will be shipped out of the country this year.

Growth Level: Acetone's growth level has moved in line with the rate of economic growth. Methyl methacrylate and bisphenol-A, the most promising outlets now for acetone, both show healthy growth gains. The reverse is true of cellulose acetate, which has failed to meet much of the stiff competition from other plastics in a number of areas.

Similarly, acetone consumption advances in the acetylene industry have been slowed, and the material is now barely holding its own. But, so balanced, the over-all demand is steady, if slight, and shows no sign of possible backslide.

Acetone's commercial importance may be compared to that of ethyl alcohol or formaldehyde—a heavy tonnage, low-cost workhorse vital to the CPI. Since acetone is now a matured product, suppliers shouldn't have a hard time staying a length or two ahead of consumption as long as nothing new appears on the scene to take an unexpected bite out of the supply.

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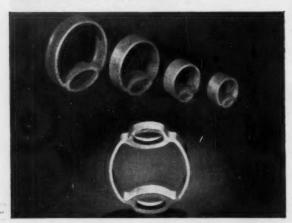
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Now ALCOA has developed a new product, DUO-TRACE,* to expand the design range of integrally traced piping systems. DUOTRACE contains not one but two trace chambers plus a product chamber in a single ex*Trademark of Aluminum Company of America



Fittings and connections for UNITRACE and DUOTRACE: Unflanged connections can be made easily and effectively with the special UNITRACE Trace Cap. As illustrated, trace chambers in adjoining sections are cut back and a circumferential weld is made to seal the product chamber. The cut back trace section is then covered with a UNITRACE Trace Cap welded in place with 4043 weld wire. Simple, efficient flanged connections utilize special UNITRACE flanges designed to accommo-

truded aluminum pipe. This makes DUOTRACE the perfect solution to the need for recirculating tracing systems.

Today, the ingenuity of process industries designers has indicated intriguing new areas of potential use for both UNITRACE and DUOTRACE. Consider, for instance, the process economies which can result from the substitution of either UNITRACE or DUOTRACE for unit heat exchangers and preheaters.

Here you see an outstanding example of the way in which ALCOA is putting over 40 years of process industries experience to work to make aluminum your good design habit. You are invited to share that experience—through a series of engineering conferences which ALCOA is holding this year in a number of major cities. Your local ALCOA sales office will be happy to furnish details.

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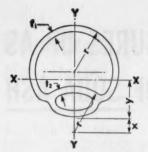
date both trace and product chambers. Jumper connections are used to carry the trace across the connection, and special impingement plates in the flange shield the product chamber from erosion as steam passes through the flange. Valves, pumps and other fittings can be incorporated into the traced systems by using UNITRACE flanges which mate with all 150-lb ASA flanges, valves and pumps. UNITRACE and DUOTRACE, systems accommodate standard preformed pipe insulation.



UNFLANGED CONNECTIONS

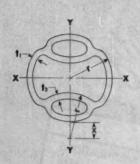
FLANGED CONNECTIONS

VALVES AND FITTINGS



	Unitrace Sizes	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	8 in.
Axis	Moment of Inertia (I) in. ⁴ Radius of Gyration (R) in. Section Modulus (S) in. ³	.09 .37 .13	.34 .58 .34	.72 .72 .56	2.71 1.09 1.42	6.52 1.42 2.65	31.82 2.12 8.73	81.82 2.78 17.22
Axis	Moment of Inertia (I) in.4 Radius of Gyration (R) in. Section Modulus (S) in.3	.09 .37 .14	.33 .57 .34	.70 .71 .59	2.65 1.08 1.52	6.36 1.40 2.83	29.72 2.05 8.97	76.70 2.69 17.79

Sizes	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	8 in.
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t ₂	.145	.163	.174	.185	.200	.307	.354
×	.133	.344	.406	.625	.813	1.500	2.000
У	.61	.87	1.08	1.59	2.03	2.98	3.87



15000	Duotrace Sizes	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	8 in
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*Min. Bend Radii (in.) Wetted Perimeter (in.) Product Trace (each) Fitting Weights (ib)	3.35 1.49	8 4.92 1.71	10½ 6.31 2.40	6.28 1.87	9.68 4.13	9.65 3.22	12.72 5.32	13.02 4.23	36 18.63 6.75	48 24.75 9.63
Trace-Caps Elbows Impingement Plates Stub Ends Terminal Casting	.102 .706 .024	.126 1.347 .039	.240 2.111 .057	.13 2.65 .65 .50	:464 5.244 .101	.40 6.59 1.50 1.12	.674 9.649 .162	.55 11.68 2.13 1.75	1.67 27.76 .22	2.92 52.51 .34
	1-2 i	n.	11/2-21/2 in.		2-3 in.	3-4 ii	n.	4-6 in.	(-8 in.
Adapter Flanges	2.41	9	3.816		4.774	7.21	6	11.106		19.23

(Note: UNITRACE values are indicated in clear areas in the table above. DUOTRACE values are shown in the shaded areas.) *Unitrace may be bent in any direction to these radii provided reasonable tooling is employed.

Aluminum Company of America, 870-J Alcoa Building, Pittsburgh 19, Pa. Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries: □ 10197 Aluminum Pipe and Fittings
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□ 514 Alcoa Duotrace Technical Report
□ 10270 Alcoa Utilitube
□ 10460 Process Industries Applications of Alcoa Aluminum □ 11453 Solving Refinery Corrosion Prob-lems with Aluminum □ 20849 Resistance of Aluminum Alloys to □ 20437 Aluminum Alloy Heat Exchangers in the Process Industries □ 19416 Brazing Alcoa Aluminum □ 19415 Welding Alcoa Aluminum □ 19051 Alcoa Aluminum Handbook Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres Name. Company_ Title. Address City_ Zone State. ALCOA ALUMINUM For exciting drama watch "ALCOA THEATRE" alternate Mondays, NBC-TV, and "ALCOA **ALUMINUM COMPANY OF AMERICA** PRESENTS" every Tuesday, ABC-TV

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Market Newsletter

CHEMICAL WEEK
September 24, 1960

Prospects of higher West Coast ammonia prices dimmed last week, when Shell, the industry's biggest producer in the West, did not notify its customers of any price advances. Under terms of most contracts, customers must be notified of changes 15 days in advance of the quarter (Oct. 1). Now, with the Sept. 15 date passed, and Shell still holding the line, the industry will continue to move ammonia at the \$66/ton quote.

Earlier this year, Hercules, Valley Nitrogen and Collier Carbon tried to lift tabs by posting higher schedules for Oct. 1 (CW, Aug. 6, p. 58). Now it's probable that quotes will gravitate to the \$66/ton level, since there is more than ample ammonia capacity on the coast.

Coal-tar benzene producers also by-passed notifying customers of any price changes on Sept. 15, thereby helping to hold benzene tabs at 34¢/lb. As with petroleum producers, the coal-tar industry feels it would be poor marketing practice to lift prices now, then wind up dropping quotes in another six to eight months when the supply picture reverses itself (CW Market Newsletter, Sept. 3).

Major coal-tar producers and Dow have upped phenol tabs, making the recent 1¢/lb. across-the-board increase industry-wide. There had been some speculation that Dow, largest U.S. phenol producer, might not go along with a hike (CW Market Newsletter, Sept. 17).

Reflecting the increased raw-material costs, Union Carbide increased prices of its phenolic compounds $\frac{1}{2}-1\frac{1}{2}\frac{e}{l}$. And Monsanto recently raised its prices on phenol-formaldehyde liquid and solid resins $\frac{1}{4}-1\frac{1}{2}\frac{e}{l}$.

A major drop in price of polymethylene polyphenylisocyanate has been posed by Carwin Co. Formerly priced at \$2.25¢/lb. it's now \$1.50/lb. in drum lots. Major interest in this polyisocyanate is in the high-temperature-resistant (600 F) urethane foam systems that can be made with it.

Chemical marketers are in for tough selling in '61, although a full-blown recession doesn't seem likely (see CW Washington Newsletter, p. 44). That's the latest word from marketing experts in New York last week for the National Industrial Conference Board's annual marketing conference.

Chemical sales volumes will level off in '61, according to Allied Chemical's I. H. Munro, marketing vice-president. Reasons: higher costs, stepped up competition both here and abroad, and overcapacity.

Liquid hydrogen capacity of three Air Force plants—called the "Bear" series—was declassified last week.

Market

Newsletter

(Continued)

Possibly the largest liquid hydrogen plant in the world, "Papa Bear" is reported to have an output potential of 60,000 lbs./day. This unit went onstream early last year, is located in Florida's Everglades near West Palm Beach. Another operation in the same area is medium-size "Mama Bear," capable of turning out 7,000 lbs./day of product. Smallest of the trio and first to be built is the 1,500-lbs./day "Baby Bear" operation in Painesville, O.

All three units were built and are operated by Air Products during a program started in '56 by the Air Research & Development Command. The entire program was kept a close secret until early last year, when Gen. Bernard Schriever, commander of ADRC, revealed the existence of the liquid hydrogen production facilities (CW Technology Newsletter, May 16, '59).

On the West Coast, another liquid hydrogen plant to supply the needs of the National Aeronautics and Space Administration was recently started up. It was designed and built by Linde Co., division of Union Carbide. Capacity: 13,000 lbs./day. Meanwhile, NASA is currently talking with private firms about having another plant built—about three times as large as Linde's—to supply its additional needs. Linde and Shell Chemical are among the firms said to be seeking the award.

President Eisenhower signed the helium conversion bill, which will permit private industry to participate in the \$500-million federal program. Under the measure, the Interior Dept. is authorized to enter into long-term purchase contracts to buy crude helium from plants financed, constructed and operated by private industry. The program calls for construction of 12 extraction plants.

Government officials say a number of companies want to build and operate the plants. Among them: National Distillers & Chemical, Phillips Petroleum, Cities Service, Socony, and three gas pipeline companies—Transcontinental, United Gas and Colorado Interstate.

The boom in British plastic sales slowed down slightly in secondquarter '60, according to figures released by Britain's Board of Trade.

Net sales of plastics during this period totaled 143,100 long tons vs. the record output of 146,000 tons during the first three months of the year. Still, sales were almost 12% higher than in second-quarter '59.

Actually, the production rate during the second quarter was slightly higher than in the first quarter. As a result, manufacturers' stocks rose by 10,000 long tons, to 76,100 tons, during the period. Almost all of this rise was due to a buildup of thermoplastic stocks, which rose to 56,000 tons as of June 30. Thermoplastic stocks at the end of June last year were only 39,200 tons.

Most manufacturers however, are not too concerned about the slight drop in sales, believe this is only a temporary, and minor, setback.



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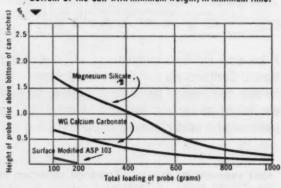
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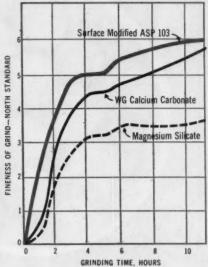
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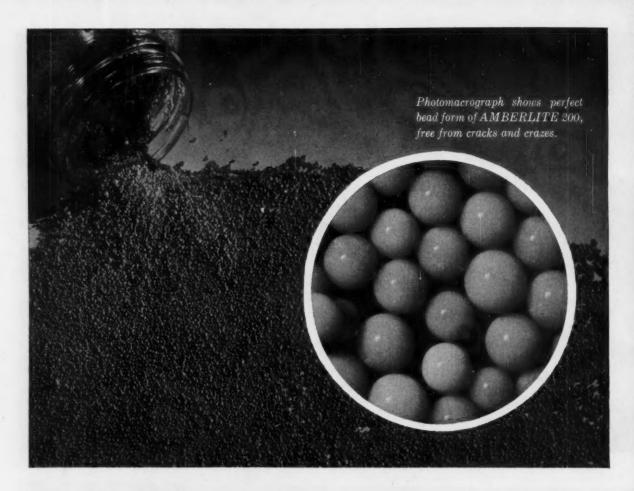
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September 24, 1960 CHEMICAL WEEK 99



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New Radioac	tive Tracer	Applications
Analytical Use	Radioisotope	Research Site
Throughput of glass lubricant in hot extrusion of stainless steel	Na ²⁴ In sodium silicate	Tube Investments Re- search Laboratories (Cambridge, England)
Hydrogen in metals (embrittlement control)	Tritium	United Kingdom Atomic Energy Authority (Aldermaston, England)
Impurities in molten fluoride reactor fuel	Labeled rare-earth fluorides	Oak Ridge National Laboratory (Oak Ridge, Tenn.)
Preparation of high- purity silicon	P32	The Electrical Communication Laboratory (Musashino-shi, Tokyo, Japan)
Wear of sheet-metal shearing tools	W187	The Institute of Physical and Chemical Research (Komagome, Bunkyo-ku, Tokyo, Japan)
Lubrication and wear of large diesel engines	Zn45	Battelle Memorial Institute (Columbus, O.)
Wear rate of cast grinding balls	Co40	Dept. of Mines and Technical Surveys (Ottawa, Ont., Can.)
Humidity of wool	(measurement of neutron scattering)	Polska Akademia Nauk (Krakow, Poland)
Storage capacity of silver-zinc batteries	Znis	Central Research Institute for Chemistry of the Hungar- ian Academy of Sciences (Budapest, Hungary)
Current efficiency in alu- minum electrolytic tenks	Aul 98	Institute of Basic Technical Problems, Polish Academy of Sciences, Dept. of Isotope Research (Warsaw, Poland)
Leaks in hermetically sealed components	Kres	Wantage Research Laboratory (Wantage, Berks, England)

Tracers Find New Jobs

Cutting across industry lines, new radioisotope uses (above) reflect the broad opportunities that remain in this field of research. They were reported in depth at last week's Conference on the Use of Radioisotopes in the Physical Sciences and Industry, held in Copenhagen.

The meeting was sponsored by the 70-nation International Atomic Energy Agency (headquartered at Vienna,

Austria) in cooperation with the United Nations Educational Scientific and Cultural Organization.

Although radioisotopes are a familiar money-saving tool in industry—e.g., in checking wear of machine parts, paint and wax coatings, and finding leaks inside complicated piping systems, their full potential is relatively untapped, in the opinion of many experts. Paul Aebersold, di-

rector of the U.S. Atomic Energy Commission's Office of Isotopes Development, says: "Radiotracing might well, in the long run, prove to be the most important and unique use of atomic energy."

Versatility, as well as speed, sensitivity, and specificity of tracer techniques are major reasons for this. One reason for versatility: of the 102 known elements, there are about 900 radioisotopes (radiation-emitting, unstable atoms that are chemically the same but different in weight and nuclear structure from parent elements).

How this versatility can pay off is illustrated by the work on high-purity silicon, as reported at the conference. Japanese researchers Torao Ichimiya, Hideo Baba and Tadashi Nozaki, of the Electrical Communication Laboratory in Tokyo, worked with phosphorus-32 in perfecting a purification method of making hyperpure silicon used in semiconductor devices. Their choice of process-thermal decomposition or hydrogen reduction of silicon tetraiodide-requires precise knowledge of the behavior of trace amounts of impurity elements during the purifying process.

Briefly, elemental silicon is reacted with iodine, the resulting silicontetraiodide is distilled, dissolved in tolune, filtered and crystallized, and the latter purification steps are repeated. Activated red phosphorus, as phosphorus iodide, was mixed with silicontetraiodide before the purification steps were begun. The phosphorus iodide (as a measure of radioactivity) was checked after each purification step. The results showed that repeated recrystallization effectively removed this intentionally introduced impurity.

Determination of hydrogen in metals by a novel method, was described by C. Evans and J. Herrington, of the United Kingdom Atomic Energy Authority (Aldermaston, England). Analysis of hydrogen is important in certain metals and alloys that are subject to embrittlement by the gas. Working with aluminum, beryllium and uranium, Evans and Herrington used tritium to dilute hydrogen in the metal. It is a complicated procedure and it requires data on equilibrium conditions for hydrogen-tritium mixtures.

Powdered glass bonded with sodi-

um silicate solution is now commonly used in the hot extrusion of stainless steel tubing. The glass becomes molten, providing a thin continuous layer of lubricant as the steel passes over the die.

To find out how uniformly the glass lubricant is distributed in this process, J. Golden and G. W. Rowe, of Tube Investments Research Laboratories (Cambridge, England), tagged the silicate binder using sodium-24. Because experiments were conducted in an industrial plant (Chesterfield Tube Co.) the researchers used this nuclide with a short half-life (less than 15 hours) to avoid hazard.

Activation Analysis: Advances in activation analysis—route to faster, more accurate information on the composition of a wide variety of materials ranging from human blood to smog—were also reported at the conference. In this form of analysis, irradiation of atomic nuclei by slow neutrons causes them to become radioactive. Energy and rate of emission of this radiation are characteristics that identify the isotope that has been formed.

The principle is well established and is commonly used by petroleum companies, for example, in determining the amount of trace molybdenum imparted to hydrocarbons by catalysts. But so far activation has been limited in its development as a routine analytical tool because it requires a large number of operations. These include irradiation of the sample, measurement in a spectroscope of the radiation properties, then handling the extensive data resulting from these measurements.

Texas A. & M. graduate student William Kuykendall, Jr., has hooked up a computer in this chain of operations, sharply reducing the time required for necessary calculations. He also uses a special analyzer to provide the data on isotope components in the irradiated sample. It still takes minutes, sometimes hours, to come up with the answer; but with further development of the process, it is expected to handle 3,000-4,000 samples a day.

W. Wayne Meinke of the University of Michigan's Dept. of Chemistry told the conference his research group has been working with a portable neutron generator, which he



Texas A. & M.'s Kuykendall slashes time required for isotope analysis.

says "shows great promise" in acti-

While the savings that research of this kind can contribute to industry are difficult to estimate, they're impressive. A recent report, "Radioisotopes in Industry," by The National Industrial Conference Board, notes that a survey of 523 companies disclosed average annual benefits of \$100,000 from using radioisotopes. By chopping costs of labor, raw materials, research time, scrap, and the like, in this fashion, radioisotope research is now more than paying its way.

New Incentive: Meanwhile, to spur commercial use of radioisotopes, the Atomic Energy Commission's Isotope Sales Dept. at Oak Ridge, Tenn., has drastically cut its prices of cobalt-60. Customers, as of Sept. 15, may purchase Co-60 for \$1/curie (the standard unit of measure for atomic radiation equal to the energy emitted by 1 gram of radium). But to get the new price, purchases must be made in amounts of more than 100,000 curies.

Formerly, AEC sold the Co-60 with a specific activity of more than 40 curies/gram at \$5/curie, with a 30% discount on purchases of more than 25,000 curies. Now the \$1/curie price applies, regardless of the specific activity in curies/gram.

This means that more firms can afford radiation research and development, including use of Co-60 to prepare radioisotopes. AEC's offer, plus process savings possible with tracers, is calculated to stir new interest in "tagged" atom uses.

ACS Research Reports

Over 16,000 chemists gathered in New York for the American Chemical Society's recent 138th national meeting—undaunted by Hurricane Donna, which hit the city soon after the start of the week's meeting. As usual, the society's 22 divisions lined up an impressive array of scientific papers; this time there were 1,761.

Among developments with possible commercial interest are these:

- Two new classes of antitumor agents. E. Y. Sutliffe of Arizona State University (Tempe) has investigated a number of derivatives of 4-aminopyrazolo- (3,4-d)-pyrimidine, and is working toward a compound with a higher therapeutic index than the parent material. Another approach taken by S.-C. J. Fu of the Children's Cancer Research Foundation (Boston), is to combine a nitrogen mustard and folic acid.
- Removing small amounts of detergent from water systems was studied by Irving Abrams of Chemical Process Co. (Redwood City, Calif.). After testing a number of ion-exchange resins of varying basicities for their ability to remove 2-100 ppm. of alkylbenzene sulfonates in the chloride cycle, Abrams concluded that a strongly basic Type 2 anion exchanger, Duolite A-102D, did the most effective job.
- A long-term study of rickettsiostatic agents by Hugh Donahoe of St. Louis University and co-workers has been widely expanded. A number of mono- and bis-p-alkoxybenzoic acids were prepared and tested for activity. Main result is a growing knowledge of structure-activity relationships in this field.
- · An improved method of grafting olefins on cellulose was reported by E. H. Immergut of the University of Toronto. Styrene grafting that gives a weight increase of over 50% can be accomplished by the technique (compared with 1% by conventional direct immersion of the cellulose in styrene). The new method involves inclusion of the styrene in the cellulose by a series of steps: swelling the cellulose in water and alkali, extracting the water with methanol, replacement of the methanol with benzene, then replacement of the benzene with styrene. High-energy radiation polymerizes the styrene.



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New emulsifiers take the 'drip' out of ice cream, improve texture.

Treat for Emulsifier Makers

Recent Food & Drug Administration approval of two new emulsifiers for use in frozen desserts reflects expanding research in the 100-millionlbs., \$40-million/year food emulsifier field. The compounds are polyoxyethylene (20) sorbitan tristearate and polyoxyethylene (20) sorbitan oleate (the 20 stands for mols of ethylene oxide).

The newcomers are offered commercially as Atlas Powder's Tween 65 and Glyco Products' TS-20; and Atlas's Tween 80 and Glyco's O-20, respectively. FDA applications are pending for approval of additional emulsifier uses of these products.

Companies active in food emulsifier research are chary about giving details. But the chemical areas of major interest and the problems in this field are no secret. They're shared not only by the firms (e.g., Atlas, Glyco, Witco, E. F. Drew) that supply emulsifiers to manufacturers of food preparations but also by companies that make emulsifiers for captive use (e.g., Procter & Gamble and Lever Bros.).

What's Needed: Right now there's pressure from food manufacturers to find emulsifiers that do a better job in lower concentrations. In ice cream, for example, the emulsifier "ties" fats and water, makes a product "dry" in appearance and texture, with less tendency to drip. It's used in concentrations of less than 0.1%, inhibits

the formation of ice crystals.

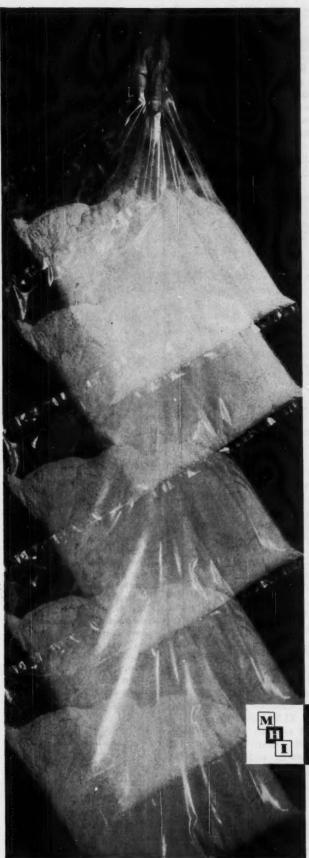
In cake mixes, the emulsifier serves to preserve freshness. A major emulsifier target now getting a lot of research: prolonging the freshness of doughnuts.

Mono- and diglycerides are the dominant types of edible emulsifiers. About 70 million lbs. of these compounds — which include glycerol mono- and distearates, glycerol oleostearates, and various derivatives of partial glycerides, are consumed annually. They cost 18-20¢/lb., are used mostly in baked goods.

Lactic acid derivatives are another major area of research. Glycerol lactopalmitate and glycerol lactostearate are superior performers in certain uses, but they cost over 50¢/lb. Propylene glycol fatty acid esters (32-40¢/lb.) are gaining in importance; they work particularly well, for example, in aerosol whip materials. In manufacturing this type of emulsifier, formation of the exact ester is critical. Mixed esters won't do; and some of the best research is on processes to make the precise compound desired.

In the case of glycerides, use of those made by glycerolysis of edible fats is universally approved by FDA. Those made by reaction between glycerin and fatty acids (e.g., stearic acid) may strike a snag. FDA now insists that the fatty acid in this reaction must be free of the chick edema factor. That's because certain commercial stearic acids in the diets of chicks cause severe edema (swelling), a hint of possible danger to human beings. Screening the acids against chicks is expensive, and trade sources feel this requires an increase of 3-5¢/lb. in the price of the glyceride emulsifier.

Stumbling Blocks: But there are problems in developing new products. A big hurdle, of course, is the Food Additives Amendment of '58, putting stiffer requirements on chemical products combined with or coming in contact with food. An FDA spokesman tells CHEMICAL WEEK there is no bottleneck in approving applications for the use of emulsifiers. But, he says, "It takes a certain amount of time to process applications, and we're meeting the deadlines set forth by the law." Under the '58 law, he adds, the Administration must take action on such applications within 90



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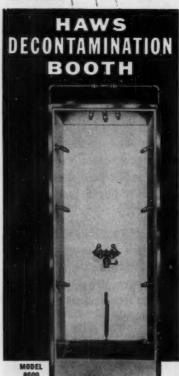
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RESEARCH

days. However, an official of Hazleton Laboratories (Falls Church, Va.), a consulting firm that conducts toxicity tests on products, claims: "The Administration has really been holding up the works, and has already put some small companies out of business." Clearing new compounds for toxicity can cost over \$100,000—an expense that some smaller companies find prohibitive.

There's a further complication: when the '58 act became effective it clouded the future of polyoxyethylene emulsifiers. Although these materials are now permitted under FDA extensions to '61, their future after that date is still uncertain.

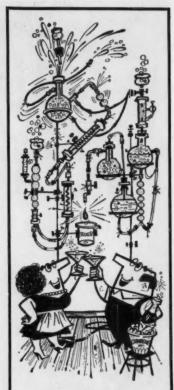
But despite these uncertainties, as living standards rise and the population increases, food emulsifiers figure to chalk up market gains. Research to make them safer, cheaper and more efficient is expected to pay off in sales that are virtually guaranteed.

EXPANSION

- Allied Chemical will build 50,000 sq.ft. of additional research space at its research center near Morristown, N.J. Completion is expected by June '61.
- Black-Clawson Co. has completed a new pulping and papermaking research laboratory at Middletown. O.
- Riegel Paper Corp. is expanding its research laboratories at Milford, N.J.
- The new Pfizer Medical Research Laboratories at Groton, Conn., will be dedicated Oct. 6.
- Columbia Cellulose Co., Ltd. (Vancouver, B.C.), will build research facilities adjacent to its Prince Rupert pulposill

Diablo Laboratories, Inc. (Berkeley, Calif.), is constructing a laboratory for drug, chemical, food and biological testing.

- ICI affiliate Canadian Industries Ltd. will spend \$3.5 million to expand its central research laboratory at McMasterville near Montreal. Completion is set for mid-'62.
- The Lucidol Division of Wallace & Tiernan Inc. plans to build a \$750,000 research laboratory in Tonawanda, N.Y.
- Research activities of Du Pont's Electrochemicals Dept. have been realigned to give greater emphasis to

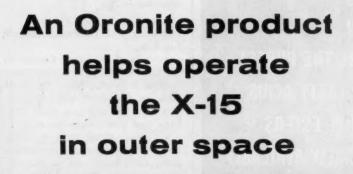


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Got a production problem? Does it involve the manufacture of a compound that's not generally available in the quantity or purity you require? Then consider this. We are equipped for and experienced in synthesis on a custom basis for quantities in the largerthan-laboratory-but-lessthan-tankcar range. For information about this service, or a quotation, write Distillation Products Industries, Eastman Organic Chemicals Department. Rochester 3, N. Y.



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Recent flights of the amazing X-15 are another giant step forward in man's continuing desire to personally visit other worlds.

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USAF



functions.

• Viron, a division of Geophysics
Corp. of America, is moving to larger
facilities in Anoka, Minn. Its operations are concerned with utilization
of plastics for satellites, space struc-

supporting and pioneering research

tures, and atmospheric research.

• Corning Glass Works plans a
400-acre research and engineering
center three miles west of company
headquarters at Corning, N.Y.

 National Starch and Chemical Corp. has opened a new textile service laboratory at Atlanta, Ga.

• Sun Chemical Corp. has moved its Michigan Research Laboratories from Long Island City, N.Y., into expanded facilities at Wood River Junction, R.I. The move increases Sun's paper chemical research, particularly in connection with a new process the firm is developing for adding resins, pigments, etc., at the wet-end of papermaking machinery.

• A. O. Smith Corp. will build an advanced research (e.g., in solid-state physics) center at Middleton, Wis. Estimated cost: \$2 million.

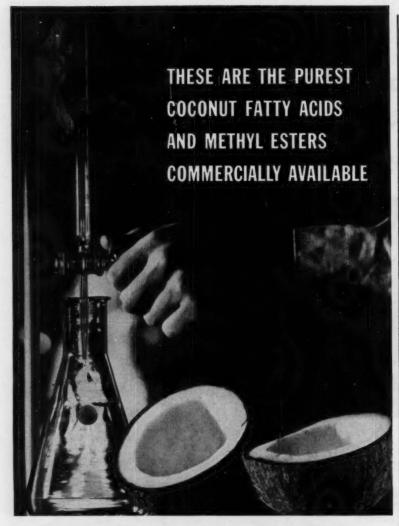
 Cleaver-Brooks Co. (Milwaukee, Wis.) will consolidate its research (e.g., in seawater conversion) in a new section located at the firm's plant in Waukesha, Wis.

 Rexall Chemical Co. and El Paso Natural Gas Products Co. will construct a research laboratory and office facilities in Paramus, N. J.

• Tretex A.G. (Zurich, Switzerland) is a new joint textile research center formed by textile firms F. M. Haemmerle (Dornbirn, Austria), Contonificio Legler S.P.A. (Ponte San Pietro, Italy), and Stoffel & Co. (St. Gallen, Switzerland). The new center will perform fiber and finishing research for the three companies, also handle licensing agreements.

Nationwide Leasing Co. (Chicago) offers a new research and development lease plan for chemical companies engaged in government-contract work. Both standard and custom-built equipment may be leased under the plan, which features terms of from three to five years, plus a cancellation clause if desired.

• F. J. Stokes Corp. (Philadelphia) now offers its laboratory facilities to food processors interested in vacuum freeze-drying foods (e.g., juices, meats) on an experimental basis, or who want to prepare small quantities



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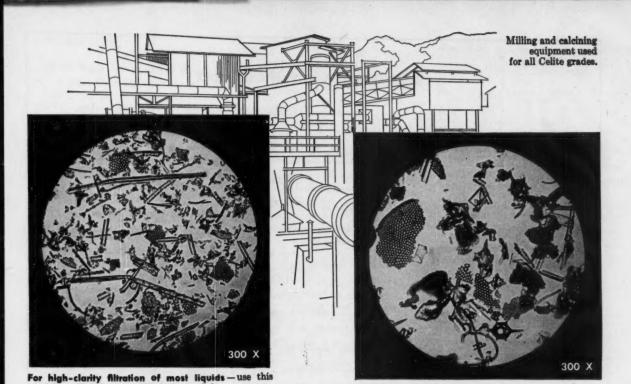
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4			* T. M. Reg.		



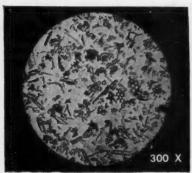
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CHEMICAL WEEK . ADVERTISERS' INDEX

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*For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1960-61

of the foods for test-panel sampling. • Solid State Materials Corp. (126 Gould St., Needham Heights, Mass.) is a newly formed electronic materials laboratory engaged in research, development and production of single-crystal intermetallic compounds,

doped silicon and germanium, paramagnetics such as doped sapphires, spinels and silicates, single-crystal and polycrystalline ferrites and garnets.

PRODUCTS

New Radiochemicals: Schwarz Bio-Research (Mount Vernon, N.Y.) has added two new radiochemicals to its line: tritiated deoxycytidine (designated *HDCY) for use in genetic studies and C14-fructose-1,6-diphosphate, barium (*CFDB) for carbohydrate metabolism investigations.

Pure Rare Earths: Six rare-earth elements are now available in new high purity from Nuclear Corp. of America (Burbank, Calif.). The elements now available in "h.p." form are dysprosium, erbium, gadolinium, holmium, samarium, and ytterbium. Specifications: less than 0.1% oxygen; less than 0.01% tantalum; less than 0.1% other rare earths; less than 0.03% iron.

Semiconductor Alloy: Alpha Metals, Inc. (Jersey City, N.J.) is now offering for semiconductor use products of 99.99%-pure gold alloyed with antimony, silicon, germanium, gallium or tin and fabricated into spheres, foil, washers, discs, rectangles and squares.

Tablet Binder: Pure-white alginic acid for pharmaceutical use as a tablet binder and disintegrant is newly available from Edward Mendell Co., Inc. (Yonkers, N.Y.).

Bifunctional Intermediate: Development quantities of lactonitrile are now being offered by American Cyanamid Co.'s petrochemicals department (New York). The compound's hydroxyl and nitrile groups make it a versatile intermediate for production of such products as detergents and plasticizers. Lactonitrile is also a selective solvent for olefinic hydrocarbons, making it particularly useful for separation of close-boiling hydrocarbon mixtures.

Tracers

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Polimon Pulverizer: Model RF8. New Condition, with 75 H.P. motor and reduced voltage starter. Liquid Nitrogen Processing Corp., Malvern, Pa. Niagara 4-5200.

Louisville 7' die. x 70' Long Retery Coeler, 1/2' welded shell, late-model, complete. Perry Equipment Corp., 1415 N. Sixth St., Phila. 22, Pa.

Liquidetion, \$8,000,000 Alcahol Plant at Omaha, Nebraaka, Dryera, Filters, Stills Evaporatora, Exchangers, Tanks, Pumpa, etc. Send for circu-lar. Perry, 1415 N. Sixth St., Phila. 22, Pa.

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Copper column 72" dia. x 46'10" high 40 trays with bubble caps, design for vacuum. Perry Equipment Corp., 7415 N. 6th St., Phila. 22, Pa.

Fillmaster—Semi & Fully Automotic peckage filling machines. \$800.00 up. Stuyvesant En-gineering Corp. Norwood, New Jersey.

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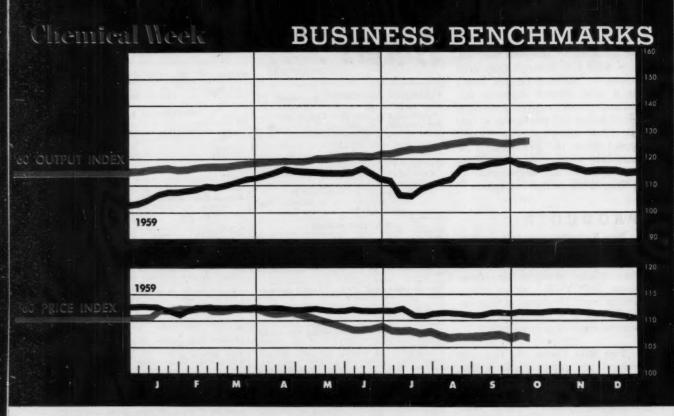
60 Lypks. Aluminum Stearate 32; ib. Bulk. Plast. 324/ib. (dark). Bulk DBS Plast. 33 w/w. Bulk Acetone Redistilled 434/gal. achiorobenzene, Bulk, 25000# 74/ib. Orthodic Benzene, Drs. 4000# 104/ib. FS-5275, Cher Week.

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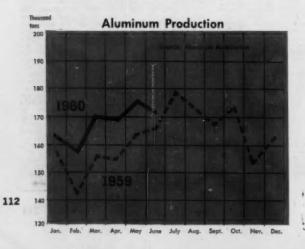


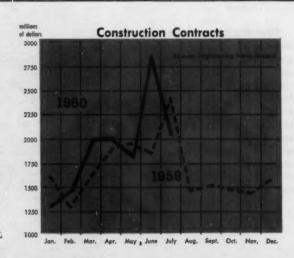
SEPTEMBER 24, 1960

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	125.0	124.6	119.8
Chemical Week wholesale price index (1947=100)	106.3	107.0	110.9
Stock price index (12 firms, Standard & Poor's)	47.06	47.24	55.90
Steel ingot output (thousand tons)	1,503	1,401	356
Electric power (million kilowatt-hours)	14,216	14,941	13,109
Crude oil and condensate (daily av., thousand bbls.)	6,784	6,823	6,813

TRADE INDICATORS	M	anufacturers' Sal	les	Manufacturers' Inventories		
(million dollars)	Latest	Preceding	Year	Latest	Preceding	Year
	Month	Month	Ago	Month	Month	Ago
All manufacturing	30,560	30,780	30,858	54,880	55,050	52,241
Chemicals and allied products	2,310	2,350	2,171	4,140	4,110	3,847
Petroleum and coal products	3,190	3,180	3,092	3,290	3,300	3,314
Paper and allied products	1,030	1,050	1,060	1,610	1,590	1,457
Textile products	1,280	1,270	1,256	2,670	2,700	2,534

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To help you evaluate Trifluoroacetic Acid, General Chemical has prepared a special new data sheet. In addition, data on General's other

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40 Rector Street, New York 6, N. Y.	
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